

# Revision of the Swedish species of *Odontocolon* Cushman, 1942 (Hymenoptera; Ichneumonidae; Xoridinae) with the description of a new species and an illustrated key to species

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Johansson, N.: Revision of the Swedish Species of *Odontocolon* Cushman, 1942 (Ichneumonidae: Xoridinae) with the description of a new species and an illustrated key to species. [**Revision av de svenska arterna av *Odontocolon* (Cushman, 1942) (Ichneumonidae: Xoridinae) med beskrivning av en ny art samt en illustrerad nyckel till arterna.**] – Entomologisk Tidskrift 141 (1–2): 23–42. Björnlunda, Sweden 2020. ISSN 0013-886x.

The Swedish species of *Odontocolon* Cushman, 1942, are revised and a new species, *Odontocolon styx* **sp. nov.** is described from Swedish material. *Odontocolon thomsoni* (Clément, 1938) **syn. nov.** is synonymized with *Odontocolon appendiculatum* (Gravenhorst, 1829). *Odontocolon cretense* (Szépligeti, 1914) **stat rev.** is excluded from synonymy with *Odontocolon appendiculatum* (Gravenhorst, 1829) and reinstated as a valid species. *Odontocolon geniculatum* (Kriechbaumer, 1889) is deleted from the Swedish species list. An illustrated key to the *Odontocolon* species occurring in Northern Europe is provided. A discussion on the potential role of *Odontocolon*-species as indicators of biologically rich forests and ecologically sustainable forestry is given.

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*Odontocolon* Cushman, 1942 is a rather small Holarctic genus in the subfamily Xoridinae, currently comprising about 45 described species worldwide (Yu et al. 2016). The species are mostly restricted to the Northern temperate zone (Broad et al. 2018). Ten species are known from the Western Palaearctic region (Clément 1938, Kasparyan 1981, Kolarov 1997). The European species have been treated by Clément (1938) and Kolarov (1997), while the species of North America was revised by Townes et al. (1960) and the Oriental fauna by Chandra (1978) and partly by Wang and Gupta (1995). Watanabe (2017) revised the Japanese species with unmodified mid tibia. All *Odontocolon* are assumed to be idiobiont ectoparasitoids, primarily of the immature

stages of various xylophagous Coleoptera and most authenticated host records have been from Cerambycidae (Hilszczański, 2002; Broad et al. 2018). In the Western Palaearctic *Odontocolon* is distinguished from other Darwin-wasps by the buccate temples in combination with the strongly widened hind femur with a large ventral tooth. This paper reviews the Swedish species of *Odontocolon*. Eight species are recognized and revised.

## Material and methods

Specimens of *Odontocolon* were obtained from public collections in Sweden and larger private collections housing specimens from Sweden. Available and relevant types were checked,

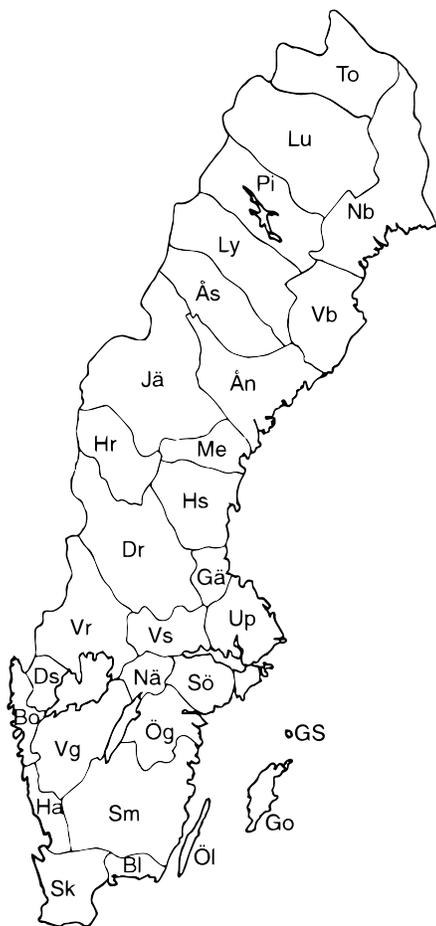


Figure 1. Map of Sweden with borders and used abbreviations for the faunistic provinces from south to north: Sk (Skåne), Bl (Blekinge), Ha (Halland), Sm (Småland), ÖI (Öland), Go (Gotland), ÖG (Östergötland), Vg (Västergötland), Bo (Bohuslän), Ds (Dalsland), Nä (Närke), Sö (Södermanland), Up (Uppland), Vs (Västmanland), Vr (Värmland), Dr (Dalarna), Gä (Gästrikland), Hs (Hälsingland), Me (Medelpad), Hr (Härjedalen), Jä (Jämtland), Än (Ängermanland), Vb (Västerbotten), Nb (Norrbotten), Äs (Åsele lappmark), Ly (Lycksele lappmark), Pi (Pite lappmark), Lu (Lule lappmark), To (Torne lappmark).

Figur 1. Karta över Sverige med inrikes gränser och använda förkortningar för faunaprovinser från söder till norr: Sk (Skåne), Bl (Blekinge), Ha (Halland), Sm (Småland), ÖI (Öland), Go (Gotland), ÖG (Östergötland), Vg (Västergötland), Bo (Bohuslän), Ds (Dalsland), Nä (Närke), Sö (Södermanland), Up (Uppland), Vs (Västmanland), Vr (Värmland), Dr (Dalarna), Gä (Gästrikland), Hs (Hälsingland), Me (Medelpad), Hr (Härjedalen), Jä (Jämtland), Än (Ängermanland), Vb (Västerbotten), Nb (Norrbotten), Äs (Åsele lappmark), Ly (Lycksele lappmark), Pi (Pite lappmark), Lu (Lule lappmark), To (Torne lappmark).

either in person by the author or by studying high-resolution photos. Coordinates for the type specimens of *Odontocolon styx* **sp. nov.**, if not present on the actual specimen label, were extracted from the available locality information given by the label. Morphological terminology follows Broad et al. (2018). Fore wing length is measured as the greatest distance from the apex of the tegula to the wing tip. Unless stated otherwise, photos by Alexander Berg were taken with a Canon EOS 6D with a reversed tube lens-Thorlabs ITL200 with either a Schneider Kreuznach Componon 28mm f4 or a Schneider Kreuznach Componon-S 50mm f2.8 and then stacked with Zerene stacker. Photos by the author were taken using an Olympus

OMD M10 MkII and an Olympus M. Zuiko 60mm/f.2.8 macro lens. Faunistic provinces and their abbreviations are listed in Fig. 1.

#### Abbreviations/Depositories (corresponding curator/contact)

HNHM = Hungarian Natural History Museum, Budapest, Hungary (Zoltán Vas).

JH = Collection of Dr. Jacek Hilszczański, Forest Research Institute, Poland (Jacek Hilszczański).

LW = Collection of Lars-Ove Wikars, Borlänge, Sweden (Lars-Ove Wikars).

MZLU = Zoologiska Museet, Lunds Universitet, Lund, Sweden (Rune Bygebjerg).

NJ = Collection of Niklas Johansson, Habo, Sweden.

NHMUK = Natural History Museum, London, United Kingdom (Gavin Broad).

NHRS = Swedish Museum of Natural history, Stockholm, Sweden (Hege Vårdal).

NMF = Natur Museum Senckenberg in Frankfurt, Germany (Steffen Pauls, Patricia Peters).

NMWU = Museum of Natural History, Wrocław University, Poland (Marek Wanat).

SLU = Collection of the Swedish University of Agricultural Sciences, Uppsala, Sweden (Mats Jonsell).

OH = The collection of Olof Hedgren, Uppsala, Sweden (Olof Hedgren).

UPSZ = Evolutionsmuseet, Uppsala University, Uppsala, Sweden (Hans Mejlon).

ZIN = Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia (Andrey Khalaim)

ZSM = Zoologische Staatssammlung München, Germany (Stefan Schmidt).

## Results

### *Odontocolon appendiculatum* (Gravenhorst, 1829)

#### **Figs 5B, 5D, 6C, 7A–E, 8A–G, 9B**

*Odontomerus appendiculatus* Gravenhorst, 1829 p.853

*Odontomerus thomsoni* Clément, 1938 p.514

**syn. nov.**

#### *Material examined*

Lectotype ♀ of *Odontocolon appendiculatum* (NMWU); Lectotype ♀, 2♀♀ and 2♂♂ paralectotypes of *Odontocolon thomsoni* (ZSM); 12♀♀ and 4♂♂, Sweden (UPSZ, MZLU, NHRS, OH, NJ); 1♀, Germany (NHMUK); 2♀♀, Poland (JH); 1♀, Russia (NHMUK); 1♀ Turkey (NHMUK); 1♂, Switzerland (NHMUK).

#### *Diagnosis*

Variable in size with a fore wing length of 5–14 mm. Metasoma strongly elongate, dorsoventrally depressed with the dorsal side of the propodeum almost in line with the mesoscutum and scutellum in lateral view (Figs 7A, 8A). Head in dorsal view usually rather square (Fig. 5D, rarely wider, as in Fig. 5C) and with quite scarce, but distinct punctures (Figs 5D, 7C, 8B). Antennae with 29–36 flagellomeres, usually red or brownish. Hind femur and

tibia with long prominent setae among the more adpressed pilosity (Fig. 9B). Body usually black with the metasoma and flagellomeres dark brownish, but frequently with the entire body darker or paler brown. Coxae dark brown, apically red. Legs and all tarsi red. The female, which lacks an oblique groove on the inner side of the mid tibia, is most easily confused with *Odontocolon quercinum* and *O. styx* **sp. nov.**, but is distinguished from both species by the long prominent setae on the hind tibia, the distinctly punctate head and the elongate mesosoma. Furthermore, the tergites in the female of *O. appendiculatum* (Fig. 5B) are longer than in *O. quercinum* (Fig. 2C) and the second and third tergites have denser punctures. In larger specimens, the punctures often merge in the basal third to form a punctate-rugose sculpture, while the sculpture in *O. quercinum* consist of scarce and very weak punctures. The basal flagellomeres (Fig. 6C) are also longer and narrower than in *O. quercinum* (Fig. 6D). The female of *Odontocolon appendiculatum* lacks the distinct regular rugose/striate punctation found in *Odontocolon styx* **sp. nov.** and has the head in dorsal view usually more square and always with more distinct punctures. The male has the prominent setae on the hind femur and tibia less distinct than in the female, but is distinguished by the transverse wrinkles of the notauli in combination with the deep punctation of the head and the more square shape of the head in dorsal view. The structure of the tergites in the male are intermediate in intensity in relation to *O. quercinum* and *O. styx* **sp. nov.**

#### *Ecology*

The majority of the few recent records have been collected by window traps on high stumps of spruce *Picea abies* and/or birch *Betula* spp. No authenticated rearing records are known. The species is active from June to August.

#### *Distribution in Sweden*

*Odontocolon appendiculatum* is a rare species in Sweden with scattered records, mainly from light boreal taiga forests in the central part of the country. Numerous older specimens in Swedish collections indicates a notable decline in numbers

**Identification Key to the Northern European species of *Odontocolon***

While the genus is quite easily identified based on the characters listed in the introduction, the inexperienced user should be aware of the risk of confusion with the Braconidae genera *Helconidea* Viereck, 1914 and *Wroughtonia* Cameron, 1899. These species often occur on dead trees together with *Odontocolon*, but have the frons centrally deeply excavate and partly reduced venation of the wings. A key to the European species of *Helconidea* and *Wroughtonia* is provided by van Achterberg (1987).

1. Lower lateral part of pronotum rugulose (Fig. 2A). A small species with fore wing length 5–8 mm. Primarily a northern species associated with coniferous forests.....*O. punctulatum* (Thomson, 1877)  
– Pronotum laterally smooth or punctate on a polished surface (Fig. 2B). Usually larger species.....2
2. Metasoma with the exception of the first tergite red (Fig. 3); hind femur black. Hosts on oak, possibly also beech in Southern Sweden.....*O. rufiventris* (Holmgren, 1860)  
– Metasoma black or brown.....3
3. Hind femur black in female and male; male with mid and fore femora partly black (Fig. 4) and head dorsally sparsely punctate (as in Fig. 5C). Hosts on conifers.....*O. spinipes* (Gravenhorst, 1829)  
– Hind femur in female and male red, if the male rarely has the hind femur black (*O. geniculatum*), then mid and fore femora are reddish and the head more distinctly punctate.....4
4. Mid tibia of female with an oblique groove on the inner side which makes the tibia appear twisted along its longitudinal axis (Fig. 2D); male without distinct transverse carinae in the notauli (Fig. 6B)...5  
– Mid tibia of female unmodified; male with distinct transverse carinae in the notauli (Fig. 6A).....6
5. Hind tibia of female black or dark brownish with a pale reddish spot basally; hind femur of male black. No confirmed Swedish records. Hosts on conifers..... *O. geniculatum* (Kriechbaumer, 1889)  
– Hind tibia of female and male uniformly coloured, usually testaceous; male with hind femur testaceous, at most brownish centrally. Quite common in coniferous forests...*O. dentipes* (Gmelin, 1790)
6. Head with dense and large punctures (Figs 5D, 7C, 8B); mesosoma in female dorsoventrally depressed and strongly elongate (Figs 7A, 8A); hind tibia and hind femur with many long conspicuous setae rising above the more adpressed pilosity (Figs 8D, 9B). Rare in Central and Northern Sweden in mixed and coniferous forests.....*O. appendiculatum* (Gravenhorst, 1829)  
– Head with scarce and small punctures (Fig. 5C); mesosoma in female less elongate, at most as in Fig. 9C; hind tibia and hind femur with fewer and less conspicuous setae (Fig. 9A).....7
7. Larger species, fore wing length 7–12 mm; female with first flagellomere unmodified, distinctly shorter than the second flagellomere (as in Fig. 6C); third tergite square; second and third tergite punctate-rugulose (Fig. 5A). Possibly hosts on aspen.....*O. styx* **sp. nov.**  
– Smaller species, fore wing length 2.5–8 mm; female with first flagellomere apically swollen, as long as second flagellomere (Fig. 6D); third tergite distinctly transverse; second and third tergite polished with scarce small punctures (Fig. 2C). Mainly hosts on oak.....*O. quercinum* (Thomson, 1877)

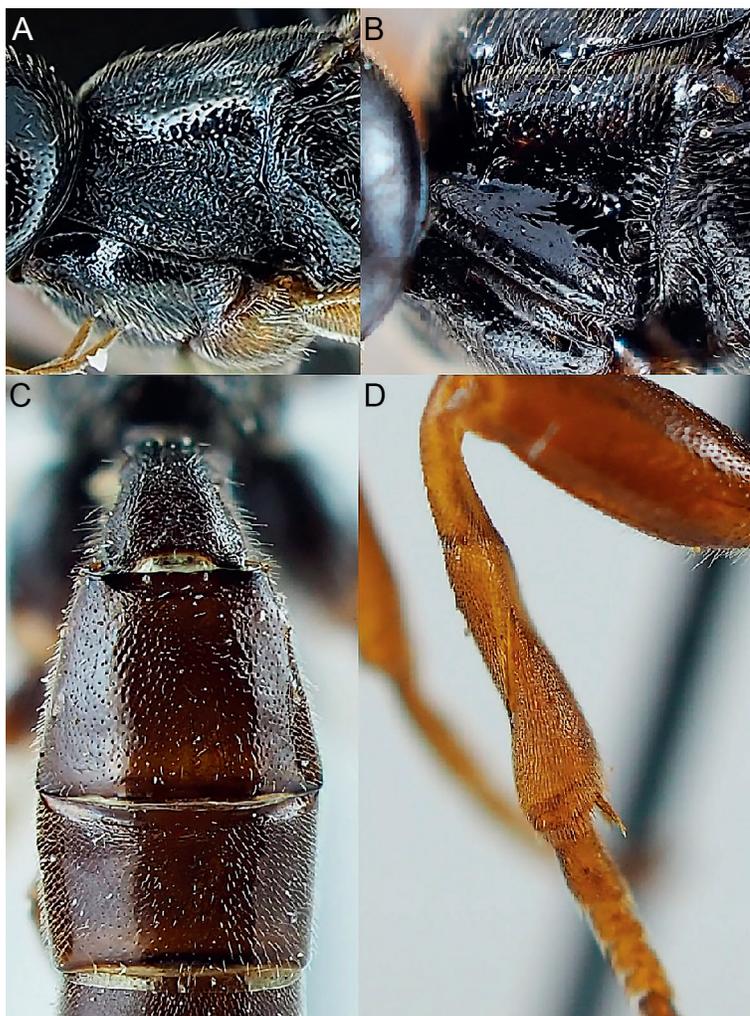


Figure 2. – A) Female *Odontocolon punctulatum*, pronotum lateral view; – B) female *Odontocolon dentipes*, pronotum lateral view; – C) female *Odontocolon quercinum*, basal segments of metasoma, dorsal view; – D) female *Odontocolon dentipes*, mid tibia posterolateral view.

Photo: Niklas Johansson.

Figur 2. – A) Hona *Odontocolon punctulatum*, pronotum sidovy; – B) female *Odontocolon dentipes*, pronotum sidovy; – C) hona *Odontocolon quercinum*, basala bakkroppssegmenten, dorsal vy; – D) hona *Odontocolon dentipes*, mellanskenben posterolateral vy. Foto: Niklas Johansson.

during the last 100 years. Bo, Dr, "Lpl", Sö, Up, Vg, Vr, Vs.

#### Remarks

The taxonomic history of this species has been subject to numerous misinterpretations. Clément (1938) showed that the species commonly interpreted as *Odontocolon quercinum* (Thomson), was not conspecific with the type of that species and subsequently described *O. quercinum* auctt. as a new species: *Odontocolon thomsoni* (Clément, 1938). He distinguished his species from *O. appendiculatum* on the larger size and darker body colour, including the infusate pterostigma

(Clément 1938), a characterization then adopted by Constantineanu & Pisica (1977). The later authors Kolarov (1997) and Varga (2014), possibly following Kasparyan (1981), add a couple of new characters for distinguishing between *O. appendiculatum* and *O. thomsoni*. According to these authors the female of *O. appendiculatum* is said to differ from *O. thomsoni*, not only in size and colour, but also in lacking long erect setae on the hind tibia and having a longitudinally rugose first tergite, while the latter has the hind tibia with long erect setae as well as adpressed setae and the first tergite punctate. Watanabe (2017), who presents a key to the Palearctic species with unmodified



Figure 3. Female *Odontocolon rufiventris*, habitus lateral view. Photo: Niklas Johansson.

Figur 3. Hona *Odontocolon rufiventris*, habitus lateral vy. Foto: Niklas Johansson.

mid tibia, adds two new characters. Apart from the absence of long prominent setae on the hind tibia and the longitudinally striate first tergite, *O. appendiculatum* is also said to be distinguished from *O. thomsoni* and *O. quercinum* by the length of the ovipositor, which is about two times the length of the body, and the absence of setae on the compound eyes. The lectotype of *Odontocolon appendiculatum* (Fig. 8A–G) in the Museum of Natural History, Wrocław University, is a rather small specimen, not strikingly pale and with long distinct setae on the hind femur and tibia. The first tergite is punctate-rugulose, not exhibiting any obvious longitudinal striae. The ovipositor is about 1.3 times as long as the body. Five of the type specimens of *Odontocolon thomsoni* in ZSM studied by the author, including the lectotype (Fig. 7A–E) (Horstmann 1992), are slightly larger, but in other respects identical to the type of *O. appendiculatum*. The conclusion is therefore that the lectotypes of *O. appendiculatum* and *O.*

*thomsoni* only represent different sized specimens of the same species and consequently *Odontocolon thomsoni* **syn. nov.** is to be regarded as a junior synonym of *Odontocolon appendiculatum*. The variation in size and partly tone of colour shall be noted and most of the larger specimens collected in Sweden have the pterostigma and body brown. The lectotype of *Odontocolon cretense* (*Odontomerus cretensis*, Szépligeti, 1914: 417) in the HNHM was studied and the specimen is not conspecific with *O. appendiculatum* from which it is distinguished primarily by the stouter metasoma and mesosoma (reminiscent of *O. quercinum*), the short pilosity of the hind tibia, without any trace of longer pilosity and the relatively sparsely punctate frons and dorsal side of the head. *Odontocolon cretense* **stat. rev.** is therefore excluded from synonymy with *O. appendiculatum* and reinstated as a valid species. *O. cretense* is quite similar to *Odontocolon styx* Johansson **sp. nov.**, and is primarily distinguished by the wider/shorter

metasomal tergites and the weaker sculpture of the second and third tergite. It is perhaps even more similar to *O. quercinum*, but lacks the short and apically widened basal flagellomeres. When using the female section in the keys to species by Kasparyan (1981), Kolarov (1997) and Varga (2014), *O. cretense* (and possibly also *Odontocolon styx* **sp. nov.**) will run out as *O. appendiculatum*, while *O. appendiculatum* will run out as *O. thomsoni*. The key provided by Watanabe (2017) follows the same pattern, but the characters regarding the length of the ovipositor and the setae on the eyes appear to be incorrect.

***Odontocolon dentipes* (Gmelin, 1790)**

**Figs 2B, 2D, 6B**

*Ichneumon dentipes* Gmelin, 1790 p.2719

*Odontomerus pinetorum* Thomson, 1877 p.777

*Ophion femoratum* Olivier, 1811 p.508

*Material examined*

Lectotype, ♀, of *Odontocolon pinetorum* (MZLU); 47 ♀♀, 32 ♂♂, Sweden (MZLU, SLU, NHRS, UPSZ, LW, NJ); 8 ♀♀, Germany (ZSM); 1 ♀, Poland (JH).

*Diagnosis*

Variable in size with a fore wing length ranging from 6–14 mm. Antenna with 32–39 flagellomeres. Body is black and legs orange. Fore coxae red to brownish and mid- and hind coxae mainly black with orange apices. The female has an oblique groove on the inner side of the mid tibia (Fig. 2D) and is therefore most easily confused with *O. geniculatum* and *O. punctulatum*. It is distinguished from the former by the paler coloration of the hind legs and the transversely striate second and third tergite (sculpture absent or weak in small specimens) and from the latter by the partly polished and punctate sides of the pronotum (Fig. 2B). The male lacks the transverse carination of the notauli, but is in other respects very variable (size, colour etc.) and probably most easily distinguished from similar species by the brown or reddish hind femur in combination with the polished and punctate sides of the pronotum.

*Ecology*

Reared from the cerambycids *Arhopalus rusticus* (Linnaeus, 1758) on scots pine *Pinus sylvestris*

L. and *Anastrangalia dubia* (Scopoli, 1763) on common fir *Abies alba* Mill. (Hilszczański 2002). The species occurs in coniferous forests and on clearcuts with high stumps and is active from late May to early September.

*Distribution in Sweden*

A rather common species all over the country. Bl, Bo, Dr, Ds, Go, Gs, Ha, Hs, Lu, Nb, Nä, Sk, Sm, Sö, Up, Vb, Vg, Vr, Vs, Ån, Ås, Ög, Öl.

*Remarks*

Frequently abnormally small, possibly starved specimens with fewer flagellomeres (32–33) occur. Varga (2014 p.150) mentions a variety based on some small males with brownish hind femur from the Ukrainian part of the Carpathians. A similar variety also occurs in Northern Sweden. The female has slightly more elongate hind tarsal segments, shorter temples and more scarcely punctate head. Based on the limited number of females known to me (n=4) and the fact that there are some intermediate forms, I refrain from drawing any more detailed conclusions on the taxonomic status of this variety.

***Odontocolon geniculatum* (Kriechbaumer, 1889)**

*Odontomerus geniculatus* Kriechbaumer, 1889 p.73

*Material examined*

1 ♀, 2 ♂♂, Switzerland (MZLU)

*Diagnosis*

Fore wing length 9–11 mm and antenna with 35–36 flagellomeres (small sample). The female, which has an oblique furrow on the inner side of the mid tibia, is distinguished from other European species by the black hind tarsi and the black or dark brown hind tibia with a paler reddish mark basally. The body and the coxae are black. The female is similar to *Odontocolon dentipes*, but apart from the obvious differences in colour it also appears to have the tergites more smooth and with less distinct sculpture. The male is lacking obvious transverse wrinkles in the notauli and has the hind legs black, apart from the trochanter and trochantelli, which are red. In this respect similar to the male of *Odontocolon*

*spinipes*, but while the male of *O. spinipes* has the mid and fore femora mostly black (Fig. 4), they are red in *O. geniculatum*. The male, with its black hind femur can potentially be mistaken for the northern variety of *O. dentipes*, which always has the infuscation of the femur paler and is smaller in average size.

#### Ecology

Host unknown, but most likely connected to coniferous forests. Probably spruce *Picea* spp. according to (Kriechbaumer 1889). Recorded from coniferous forest (Varga 2014). Around trunks of scots pine and spruce (Hilszczański 2002).



Figure 4. Male *Odontocolon spinipes*, habitus lateral view. Photo: Niklas Johansson.

Figur 4. Hane *Odontocolon spinipes*, habitus lateral vy. Foto: Niklas Johansson.

*Remarks*

Erroneously reported as new to Sweden by Hedström (1988) as *Odontocolon geniculatus*. The males that the records were based on are stored in the UPSZ and belongs to *Odontocolon dentipes*. However, given the connection to spruce it is likely that the species occurs in Sweden and should be sought on spruce logs in Southern Sweden.

***Odontocolon punctulatum* (Thomson, 1877)****Fig. 2A**

*Odontomerus punctulatus* Thomson, 1877 p.777

*Material examined*

Lectotype, ♂, of *Odontocolon punctulatum* (MZLU); 9 ♀♀, 5 ♂♂, Sweden (MZLU, NHRS, JH, UPSZ, NJ).

*Diagnosis*

One of the smallest species of the genus with a fore wing length of about 5–8 mm. Antenna with 30–32 flagellomeres. The body is black and legs orange. The female has an oblique groove on the inner side of the mid tibia, but is easily distinguished from similar species by the rugulose sides of the pronotum (Fig. 2A). The male has obvious transverse wrinkles in the notauli (as in Fig. 6A), a feature shared by some other species in the genera, but is, as the female, distinguished from similar species by the dense rugulose sculpture of the sides of the pronotum. The metasoma is sometimes brownish, but the colour could be due to the specimen being newly hatched when pinned, age or simply a natural variation in colour. The coxae are mainly orange, basally partly infuscate.

*Ecology*

The information surrounding the Swedish records leave no definitive clue to the ecology. It has been collected in window traps in coastal areas with mixed forest as well as on a newly dead scots pine *Pinus sylvestris* in a burned forest and on a dead spruce *Picea abies* in an old mature forest, but no authenticated rearing records are known. The period of activity is July to August.

*Distribution in Sweden*

*Odontocolon punctulatum* seems to be a quite rare species in Sweden, primarily connected to pristine boreal forests of the Western taiga. Most records are from the northern part of Central Sweden probably due to more intense sampling than in northern and subalpine areas where the species can be expected to be more abundant than reflected by the scarce records. Dr, Vb, Vg?, Ås.

***Odontocolon quercinum* (Thomson, 1877)****Figs 2C, 6D**

*Odontomerus quercinus* Thomson, 1877 p.778

*Odontomerus brunneiventre* Telenga, 1930

p.104–108

*Odontomerus simile* Habermehl, 1920 p.323–324

*Odontomerus liogaster* Szepliget, 1914 p.417

*Material examined*

Lectotype, ♀, of *Odontocolon quercinum* (MZLU); lectotype, ♂, and paralectotype, ♀, of *Odontocolon simile* (NMF); “cotype”, ♀, of *Odontocolon liogaster* (HNHM); lectotype, ♀, of *Odontocolon brunneiventre* (ZIN); 22 ♀♀, 17 ♂♂, Sweden (MZLU, NJ, NHRS); 1 ♀, Poland (JH).

*Diagnosis*

A rather small species with a fore wing length of 2.5–8 mm. Antenna with 19–29 flagellomeres. Head and mesosoma dark to light brownish, while the metasoma is dark to light brownish. The female has the mid tibia unmodified and is distinguished from similar species by the generally wider tergites with the third and usually also the second tergite transverse in dorsal view (Fig. 2C), the polished and scarcely punctate surface of the tergites and the short, apically widened basal flagellomeres (Fig. 6D). The female is most easily confused with *Odontocolon appendiculatum*, but has the tergites and head more scarcely punctate, the basal flagellomeres shorter and the hind tibia and femur lacking the rather dense conspicuous prominent setae usually evident in *O. appendiculatum*. The male has distinct transverse wrinkles in the notauli and shares the polished metasoma of the female. It is most likely to be mistaken for small specimens of *Odontocolon appendiculatum*, but has

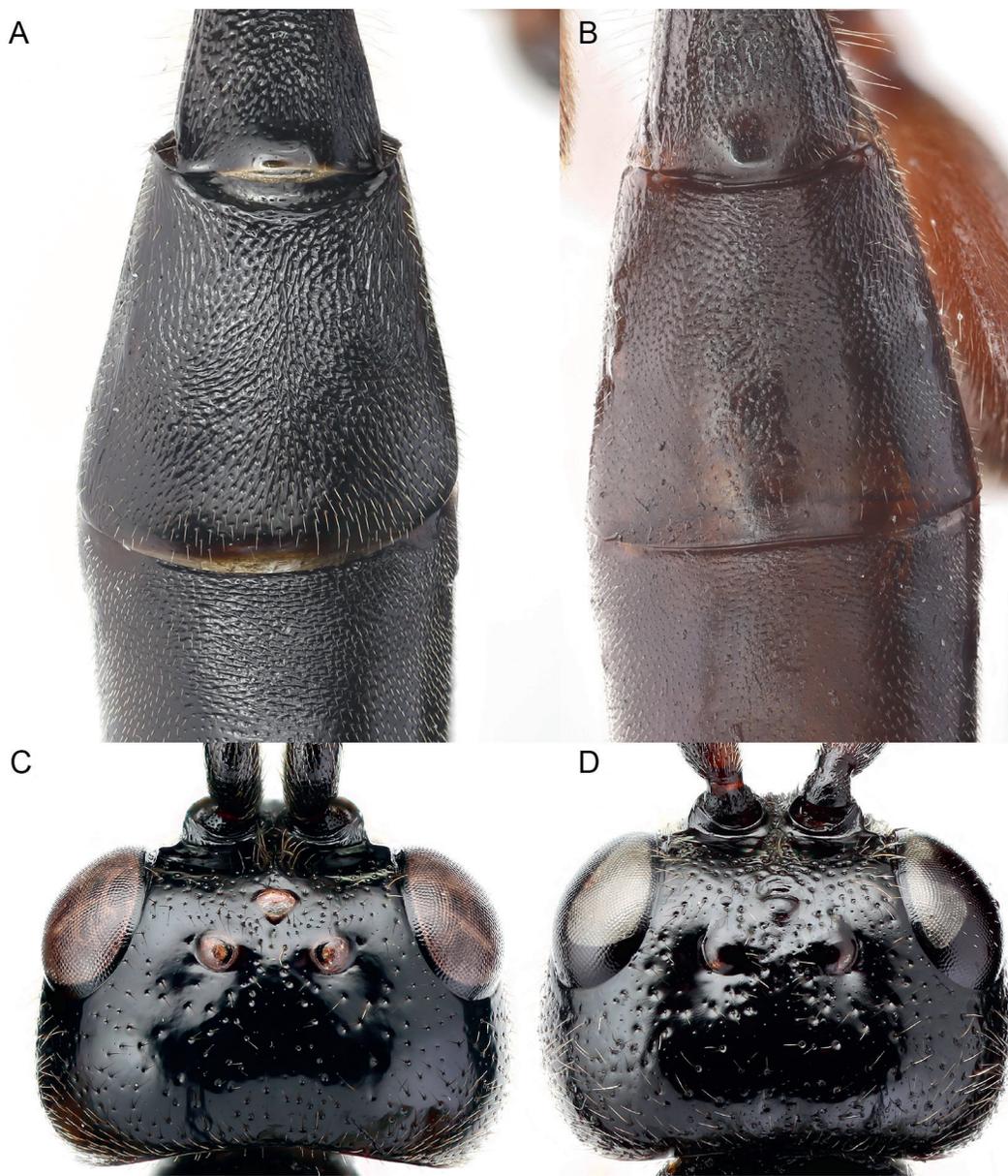


Figure 5. – A) Female *Odontocolon styx* **sp. nov.** (paratype, NHRS-HEVA000011626), metasomal segment 2 and basal part of segment 3 in dorsal view; – B) female *Odontocolon appendiculatum*, metasomal segment 2 and basal part of segment 3 in dorsal view; – C) female *Odontocolon styx* **sp. nov.** (paratype, NHRS-HEVA000011626), head in dorsal view; – D) female *Odontocolon appendiculatum*, head in dorsal view. Photo: Alexander Berg.

Figur 5. – A) Hona *Odontocolon styx* **sp. nov.** (paratyp, NHRS-HEVA000011626), tergit 2 och den basala delen av tergit 3 i dorsal vy; – B) hona *Odontocolon appendiculatum*, tergit 2 och den basala delen av tergit 3 i dorsal vy; – C) hona *Odontocolon styx* **sp. nov.** (paratyp, NHRS-HEVA000011626), huvud i dorsal vy; – D) hona *Odontocolon appendiculatum*, huvud i dorsal vy. Foto: Alexander Berg.

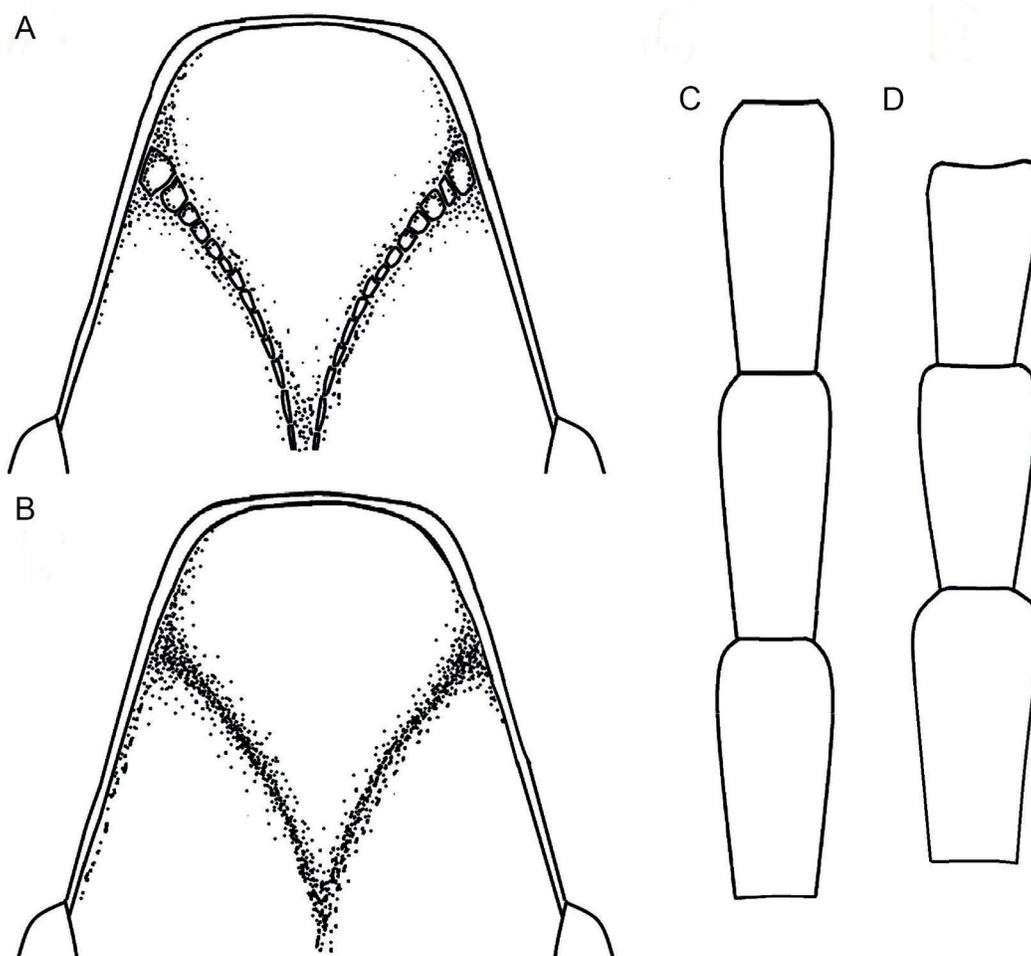


Figure 6. – A) Male *Odontocolon styx* **sp. nov.** (paratype, NHRS-HEVA000011624), mesoscutum with notauli in dorsal view; – B) male *Odontocolon dentipes*, mesoscutum in dorsal view; – C) female *Odontocolon appendiculatum*, basal flagellomeres; – D) female *Odontocolon quercinum*, basal flagellomeres.

Figur 6. – A) hane *Odontocolon styx* **sp. nov.** (paratyp, NHRS-HEVA000011624), mesoscutum och notauli i dorsal vy; – B) hane *Odontocolon dentipes*, mesoscutum i dorsal vy; – C) hona *Odontocolon appendiculatum*, basala flagellomerer; – D) hona *Odontocolon quercinum*, basala flagellomerer.

the tergites much shorter in dorsal view, with the third tergite distinctly transverse.

#### Ecology

In Sweden the species is most likely connected to hosts in oak *Quercus* spp. and potentially ash *Fraxinus excelsior* L. The original description (Thomson 1877) mentions a connection to oak and all specimens studied by the author, as well as a series of more than 100 specimens determined

by Jacek Hilszczański, have been collected by window traps on oak. A series of 13 specimens has been collected in a window trap on a large ash tree ([www.artportalen.se](http://www.artportalen.se)). According to Jacek Hilszczański (pers. comm.) connected to oak and alder *Alnus* spp. in Poland, often gathering around wounds on the trees. Host records from species feeding on conifers such as *Buprestis haemorrhoidalis* Herbst, 1780, *Hylotrupes bajulus* Linnaeus, 1758

and *Monochamus galloprovincialis* Olivier, 1795 (Campadelli & Scaramozzino 1994, Constantineanu & Pisica 1977) are likely to refer to other species, see Remarks. *Odontocolon quercinum* is active from June to August.

#### Distribution in Sweden

*Odontocolon quercinum* occurs in Southern and Central Sweden, particularly in areas with a rich fauna of saproxylic insects connected to oak. Bl, Bo, Sk, Sm, Sö, Up, Ög, Öl.

#### Remarks

The initial confusion and misinterpretation of *Odontocolon quercinum* (Thomson) caused the species to be described under several new names during the beginning of the 20<sup>th</sup> century. I have checked the types of these species (see Material examined) and confirm their status as junior synonyms of *O. quercinum*. The record from *Abies cephalonica* Loudon, from Southern Europe (Greece) (Hilszczański & Plewa 2011) is interesting. The specimen has not been studied by me, but according to Jacek Hilszczański (pers. comm.) the specimen is unusually large, but in other respects in agreement with the nominate form. The rearing records from Pine *Pinus* spp. listed above (“Ecology”) may also refer to other, possibly undescribed species, which highlights the need for a more profound revision of the Western Palaearctic fauna.

#### *Odontocolon rufiventris* (Holmgren, 1860)

##### Fig. 3

*Odontomerus rufiventris* Holmgren, 1860 p.73

#### Material examined

Lectotype, ♀, of *Odontocolon rufiventris* (NHRS); 3 ♀♀, 2 ♂♂, Sweden (MZLU, NJ).

#### Diagnosis

A small to medium sized species with a fore wing length of 8–10 mm. Antenna with 30–32 flagellomeres. Body and hind femur black, hind tibia and legs red. Fore coxae red, mid coxae black with red apices and hind coxae and hind trochanter/trochantelli black. Metasoma except the first tergite red (Fig 3). The mid femur of the female has an oblique groove on the inner side (as in Fig. 2D). Both sexes are

easily distinguished from other species occurring in the Western Palaearctic by the dark hind femur and the mainly red metasoma. Potentially very pale specimens of *Odontocolon quercinum* could be mistaken for *O. rufiventris*, but the black colour of the hind femur and the usually more distinct red colour of the metasoma is diagnostic. Furthermore, the male of *O. rufiventris* lacks transverse wrinkles in the notauli, while the male of *O. quercinum* (apart from very small specimens) has distinct transverse wrinkles.

#### Ecology

In Sweden, *Odontocolon rufiventris* is exclusively connected to nemoral deciduous forests, but there are no confirmed host records. Varga (2014) lists two hosts of Meladryidae beetles referring to Hilszczański (2002), but the primary source states only that the specimens were reared from lime branches *Tilia cordata* infested by *Conopalpus testaceus* (Olivier, 1790) and *Hypulus bifasciatus* (Fabricius, 1792), not that there was a confirmed connection between these beetles and the parasitoid.

#### Distribution in Sweden

Rare and local in its occurrence. A few scattered records from the southernmost provinces. Bl, Sk.

#### *Odontocolon spinipes* (Gravenhorst, 1829)

##### Fig. 4

*Xorides spinipes* Gravenhorst, 1829 p.859–860

*Odontomerus melanarius* Holmgren, 1860 p.73

#### Material examined

Lectotype, ♀, of *Odontocolon melanarium* (NHRS); 8 ♀♀, 4 ♂♂, Sweden (NHRS, UPSZ, MZLU, LW, NJ).

#### Diagnosis

A small to medium sized species with a fore wing length of 6–11 mm. Antenna with 31–32 flagellomeres. The female has the mid tibia modified with a shallow furrow on the inner side, which makes the tibia appear twisted along its longitudinal axis (as in Fig. 2D). The male (Fig. 4), as well as the female, has the body and most of the legs black, which makes it hard to confuse with any other

Table 1. Main distinguishing characters between *Odontocolon appendiculatum* (Gravenhorst, 1829) and *O. styx* **sp. nov.**Tabell 1. Huvudsakliga särskiljande karaktärer mellan *Odontocolon appendiculatum* (Gravenhorst, 1829) och *O. styx* **sp. nov.**

	<i>Odontocolon appendiculatum</i> (Gravenhorst, 1829)	<i>Odontocolon styx</i> <b>sp. nov.</b>
Surface tergite 2	Basal 0.3–0.5 with denser punctures and weak transverse striae, remainder of the tergite with small scarce punctures (Fig. 5B).	With wave-like striation and rugulose-punctate over almost the entire surface (Fig. 5A).
Surface tergite 3	Punctures very scarce, basal 0.1 rugose punctate with weak transverse striae (Fig. 5B).	Rugose punctate over basal 0.5 intermixed with weak transverse striae (Fig. 5A).
Sculpture of frons	With large irregular punctures (Fig. 5D).	With small irregular and very scarce punctures (Fig. 5C).
Shape and sculpture of head in dorsal view	More square with distinct large punctures (Fig. 5D).	Wider with smaller and scarcer punctures (Fig. 5C).
Shape of mesosoma of female in lateral view	Longer, dorsoventrally depressed with propodeum almost in line with dorsal side of mesoscutum (Figs 7A, 7E, 8A).	Stouter with propodeum more strongly sloping (Fig. 9C).
Pilosity of hind femur and hind tibia in females	With adpressed setae and many long erect setae (Figs 7D, 8D, 9B).	With adpressed setae and a few short erect setae (Fig. 9A).

species of *Odontocolon* in the Western Palaearctic. Otherwise, the male might possibly be confused with the male of *Odontocolon geniculatum* (Kriechbaumer) which has the mid and fore femora entirely red.

#### Ecology

*Odontocolon spinipes* is probably mainly connected to hosts on spruce *Picea abies* and occurs in forests with a continuity of dead wood. No reliable host records are known, but it has been reared from spruce stumps infested with various xylophagous coleoptera such as *Rhagium inquisitor* (Linnaeus, 1758) and *Ips typographus* (Linnaeus, 1758) (Hilszczański 2002).

#### Distribution in Sweden

A few scattered records from areas with pristine spruce forests, primarily in Northern and Central Sweden. A recent record from the southern part of Östergötland is the most southerly. Dr, Hs, Lu, Up, Vb, Vg?, Ög.

#### *Odontocolon styx* **sp. nov.**

**Figs 5A, 5C, 6A, 9A, 9C**

urn:lsid:zoobank.org:pub:5D09B3CF-EF56–4A13-A49C-B42A423820E9

#### Diagnosis

*Odontocolon styx* **sp. nov.** is most similar to, and probably most closely related to *Odontocolon appendiculatum* (Gravenhorst, 1829) in which the female is also lacking a furrow on the inner side of the mid tibia, has the tergites partly punctate-rugose and the pterostigma infuscate. The female of *Odontocolon styx* **sp. nov.** is primarily distinguished from *O. appendiculatum* by the wider and more scarcely and vaguely punctate head in dorsal view (Fig. 5C), the almost entirely striate-rugose second tergite (Fig. 5A), the slightly slenderer mid tarsal segments and the relatively short and dense pilosity of the hind femur and hind tibia (Fig. 9A) (Tab. 1). The male has transverse wrinkles in the notauli (Fig. 6A), fuscous pterostigma and the second and



Figure 7. Lectotype female of *Odontocolon thomsoni*. – A) habitus lateral view; – B) labels; – C) head in dorsal view; – D) basal segments of metasoma, dorsal view; – E) head and mesosoma in lateral view. Photo: Stefan Schmidt.

Figur 7. Lectotypen hona av *Odontocolon thomsoni* – A) habitus lateral vy; – B) etiketter; – C) huvud i dorsal vy; – D) basala tergiterna, dorsal vy; – E) huvud och mesosoma in lateral vy. Foto: Stefan Schmidt.

third tergite even more longitudinally striate rugose-punctate than in *O. appendiculatum*. The best distinguishing characters for the male in relation to *Odontocolon appendiculatum* seem to be the weak and scarce punctation of the frons above the antennal sockets and the dorsal side of the head as well as the wider head in dorsal view (Fig. 5C). The male paratypes of *Odontocolon styx* **sp. nov.** also have the hind tibia and tarsi infuscate (in one small male the infuscation is only on the dorsal part), while it is testaceous in all studied males of *Odontocolon appendiculatum*.

#### Etymology

The specific epithet *styx* is to be treated as a noun and refers to the dark river between the realm of the living and the dead in Greek mythology. The sculpture of the first and second tergite (Fig. 5A) is reminiscent of black waves.

#### Material examined

##### Holotype

Sweden: 1 ♀, Uppland, Uppsala, Almunge, Harparbol, 59.871°N, 18.004°E, 21 Jul. 1948; O. Lundblad leg., NHRS (NHRS-HEVA000009207).

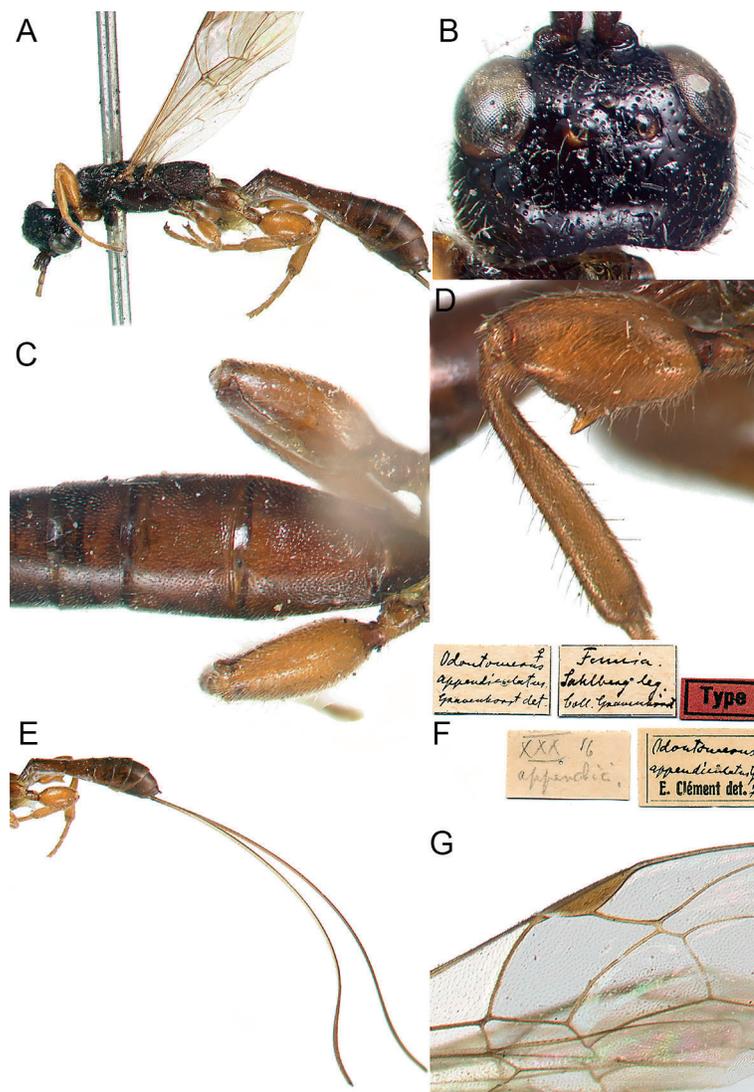


Figure 8. Lectotype female of *Odontocolon appendiculatum*  
 – A) head, mesosoma and metasoma lateral view;  
 – B) head in dorsal view;  
 – C) basal segments of metasoma in dorsal view;  
 – D) hind femur and tibia in posterolateral view;  
 – E) metasoma and ovipositor in lateral view; – F) labels;  
 – G) pterostigma.  
 Photo: Marek Wanat.

Figur 8. Lectotype hona av *Odontocolon appendiculatum*  
 – A) huvud, mellankropp och bakkropp lateral vy;  
 – B) huvud, dorsal vy;  
 – C) basala tergiterna i dorsal vy; – D) baklår och skenben i posterolateral vy; – E) bakkropp och ägglägningsrör i lateral vy;  
 – F) etiketter; – G) vingmärke.  
 Foto: Marek Wanat.

### Paratypes

Sweden: 1 ♂, Uppland, Uppsala, Vänge, Fiby urskog, 59.881°N, 17.354°E, 30 May 1947, Olov Lundblad leg., "kl" (hatched?), NHRS(NHRS-HEVA000009208); 1 ♂, Uppland, Uppsala, Vänge, Fiby urskog, 59.881°N, 17.354°E, 30 Jun. 1947, O. Lundblad leg., "kl" (hatched?), NHRS (NHRS-HEVA000009209) (Note the different dates on the two males from Fiby); 1 ♀, Uppland, Bladåker, Långbrodicket-Kolarmora, 60.037°N, 18.376°E; 3 Jul.–18 Aug. 2007, O. Hedgren leg., window

trap on high stump of birch, NHRS-HEVA000011625; 1 ♀, Östergötland, Valdemarsvik, Ringarum, Grytsbergen, 58.344°N, 16.489°E, 1 May–1 Sep. 2004, H. Andersson leg., window trap on aspen, NHRS-HEVA000011628; 1 ♀, Östergötland, Boxholm, Rinna, Björneberg, 58.193°N, 14.910°E, 6–28 Jun. 2019, N. Johansson leg., Malaise trap by fallen trunks and high stumps of aspen, NHRS-HEVA000011627.; 1 ♀, Östergötland, Boxholm, Rinna, Björneberg, 58.193°N, 14.910°E, 23 Jul.–31 Aug. 2019, N. Johansson leg.,

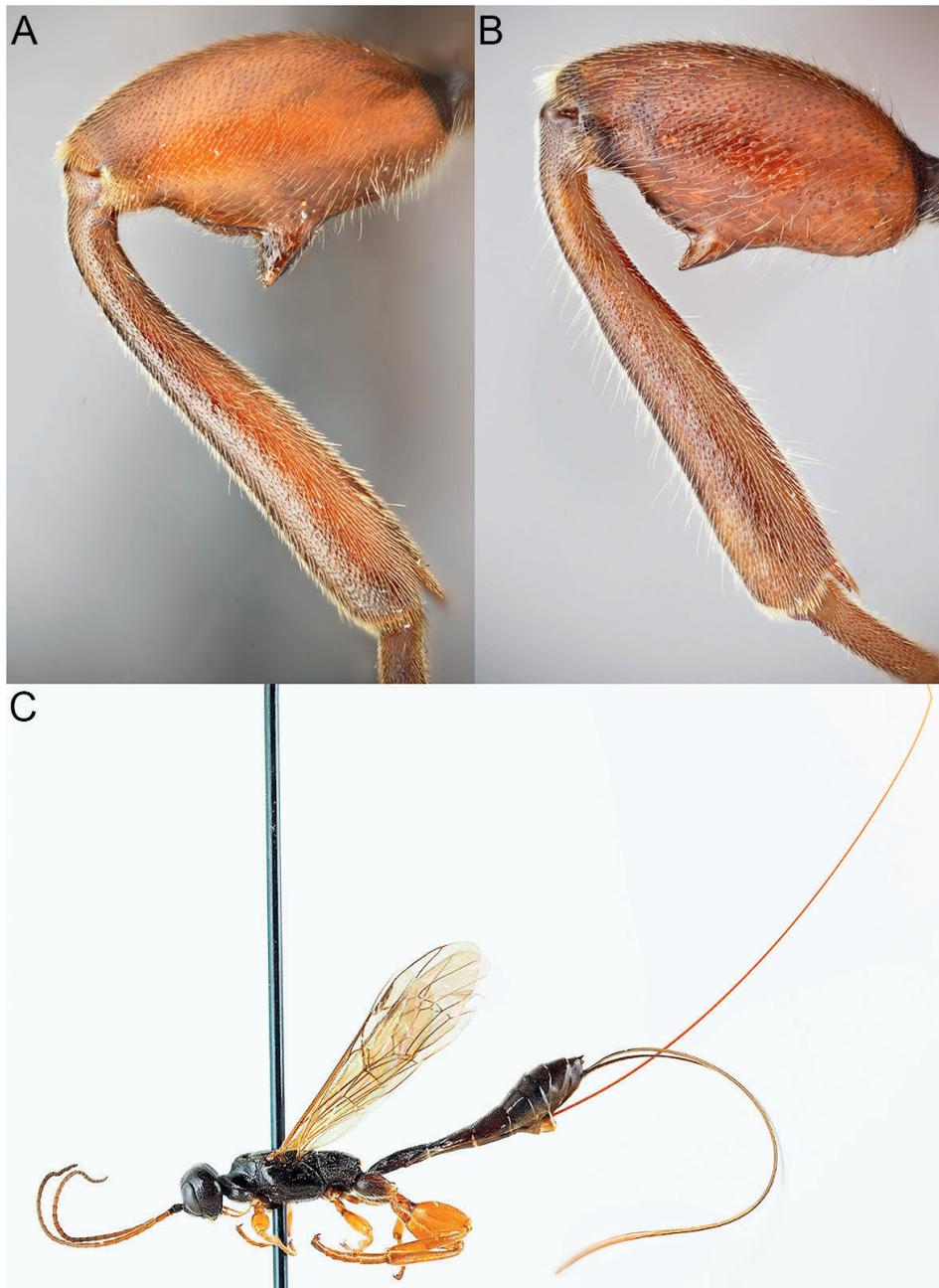


Figure 9. – A) Female *Odontocolon styx* **sp. nov.**, hind tibia in lateral view; – B) female *Odontocolon appendiculatum*, hind tibia in lateral view; – C) female paratype (NHRS-HEVA000011625) *Odontocolon styx* **sp. nov.**, habitus lateral view. Photo: A, B. Alexander Berg, C. Niklas Johansson.

Figur 9. – A) hona *Odontocolon styx* **sp. nov.**, bakskenben i lateral vy; – B) hona *Odontocolon appendiculatum*, bakskenben i lateral vy; – C) hona, paratype (NHRS-HEVA000011625) *Odontocolon styx* **sp. nov.**, habitus lateral vy. Foto: A, B. Alexander Berg, C. Niklas Johansson.

Malaise trap by fallen trunks and high stumps of aspen, NHRS-HEVA000011626; 1 ♂, Östergötland, Mjölby tätort, 58.325°N, 15.133°E, 1 May–1 Jul. 2018, H. Andersson leg., window trap in deciduous forest with old oaks, NHRS-HEVA000011624.

#### Description

Female. Body length 9.5–17 mm. Fore wing length 7–12 mm. Head in dorsal view (Fig. 5C) wider than in *O. appendiculatum* and in lateral view with the hind margin less convex. Temples polished, in ventral part with dense large punctures that sometimes merge and becomes smaller and scarcer dorsally. Frons and head dorsally with very small and scarce but distinct punctures on a strongly polished background (Fig. 5C). Face below antennal sockets polished with very large and dense punctures that sometimes merge. Malar space about 0.7 times as long as mandibular base. Temple widened behind eyes, at most about 1.7–1.8 times as long as compound eye in lateral view. Mandible bidentate, upper tooth slightly longer than lower. Antenna with 32–36 flagellomeres. First flagellomere about 2.0 times as long as wide, second flagellomere about 2.3–2.5 times as long as wide. Mesosoma in lateral view (Fig. 9C) stouter and less depressed than in *O. appendiculatum*. Sides of pronotum polished in lower part, irregularly rugulose in upper part (as in Fig. 2B). Mesosternum and mesopleuron polished with large punctures, the interstices between the punctures about equal to their diameter. Mesoscutum and scutellum polished with irregular punctures, the interstices between punctures ranging from 1.0–5.0 times the diameter of punctures. Mesoscutum centrally with punctures denser. Notauli deeply impressed making the mesoscutum trilobed, with transverse carinae (Fig. 6A). Propodeum shiny, area lateralis with large irregular punctures or partly rugulose, area superomedia with sides parallel and merged with area petiolaris. Area superomedia irregularly rugulose or with indication of transverse striae. Mid tibia unmodified without ridge or furrow. Hind femur about two times as long as wide with large ventral tooth centrally. Pilosity of hind femur and hind tibia mainly consisting of very short dense adpressed setae with some scattered slightly longer setae (Fig. 9A), hereby differing from

*O. appendiculatum*, which has the shorter setae scarcer, less adpressed and intermixed with long, strongly erect setae (Fig. 9B). First tergite about 2.0 times as long as wide with coarse, rugulose sculpture consisting of irregular rugae that becomes more rugose-punctate towards the posterior margin, the posterior 0.1 polished with very small and scarce punctures. Second tergite slightly longer than wide, longitudinally rugulose-punctate over almost the entire surface, the posterior 0.1 polished with small and scarce punctures (Fig. 5A). Third tergite weakly striate and punctate-rugose in basal 0.5, punctures becoming gradually scarcer towards the hind margin. Ovipositor distinctly longer than metasoma, mesosoma and head combined (Fig. 9C).

Male. Body length 8–13.5 mm. Fore wing length 6–9.5 mm. As in female with the following exceptions: First tergite about 4.0 times as long as wide with coarse, rugulose sculpture consisting of irregular longitudinal carinae. Second tergite about two times longer than wide, longitudinally rugulose-punctate over almost the entire surface, the posterior 0.1 polished with small and scarce punctures. Third tergite about 1.3 times as long as wide, weakly striate and punctate-rugose in basal 0.5, punctures becoming gradually scarcer towards the hind margin.

#### Colour

Body black. Legs reddish brown. Coxae black, occasionally reddish apically. Antennae brownish. Tegulae reddish, sometimes with anterior half blackish. Trochantellus and hind femur basally with fuscous spot. Pterostigma and fore wing veins black. Hind tibia and tarsi in male entirely or at least dorsally infusate.

#### Ecology

The specimens from Östergötland were collected in mature mixed forests with a rich fauna of saproxylic invertebrates connected to aspen, in traps placed at or in the immediate vicinity of groups of old dead aspen trees. The two main cerambycids occurring on aspen in the areas are *Xylotrechus rusticus* (Linné, 1758) and *Saperda perforata* (Pallas, 1773) which might be possible hosts. The specimens from Uppland in the NHRS and coll. Hedgren were collected in hotspot areas for saproxylic insects connected to aspen. Notably the specimen from

Bladåker was caught in a window trap on a high stump of birch *Betula* sp. together with a female of *Odontocolon appendiculatum*. The period of activity ranges from June to August.

#### Remarks

*Odontocolon styx* **sp. nov.** is probably partly included in the interpretation of *O. thomsoni* by Clément (1938) as that author states that the second tergite can be “runzelig gestreift, entweder in der Vorderhälfte, oder in der Mittelpartie oder an den Seiten.”. The specimens in NHRS had previously been labeled as *O. thomsoni*.

#### Discussion

Apart from the quite abundant *Odontocolon dentipes*, the Swedish species of *Odontocolon* seem to be rare and local in their occurrence. Most species are rarely recorded and available records mainly comes from specimens collected by window traps used to monitor or investigate the fauna of saproxylic beetles. Even assuming that most species have been overlooked due to the poor level of interest in the group, the absence of modern records for some species are striking when compared to the frequency of records made a century ago in major collections. A majority of the *Odontocolon* species seem to have a connection to forests with a continuity of dead wood and are sensitive to changes in the ecosystem, due to their placement at a high level in the trophic chain (Shaw & Hochberg 2001, Shaw 2006). This means that most *Odontocolon* species probably could be used as biodiversity indicators of forest ecosystems. The general picture of the distribution of the species in Sweden (and Europe) indicates that most *Odontocolon* species are indeed rare or missing in areas strongly affected by industrial forestry. On the upcoming Swedish Red List (2020), three species are included. *Odontocolon spinipes* and *O. punctulatum* are classified as NT (Near Threatened) and *O. appendiculatum*, which shows a more pronounced decline, is classified as VU (Vulnerable). If these species, as one might presume, do reflect the state of the ecosystem in the boreal taiga forests of Sweden, this may question the commonly promoted ecologically sustainable forestry model of Sweden (for example [www.swedishwood.com](http://www.swedishwood.com), [www.forestindustries.se](http://www.forestindustries.se), [www.innoforest.eu](http://www.innoforest.eu) etc. visited 2020-02-11). This at a

time when the National Forest Agency in Sweden (Skogsvårdsstyrelsen) is promoting an even more intensified industrial forestry, partly motivated by actions in relation to climate change (Normark & Fries 2019). This should also be considered in a context where biologically rich forests already have become scarce and fragmented in the Southern and Central parts of the country (Kempe & Dahlgren 2015) and in Southern Sweden more or less restricted to protected areas such as nature reserves or national parks. Natural disturbance regimes, such as fire and grazed forests, have also decreased dramatically during the last century and the impact on the structure and constitution of the forests is notable. The Swedish forests are becoming darker, damper and colder and the trees are harvested at younger ages (Claesson et al. 2015), which unavoidably will disfavour many saproxylic coleoptera and indirectly also their parasitoids. On the other hand, the awareness of biodiversity measures during harvesting, including leaving and creating dead wood in recognition of its role for saproxylic insects has increased. Overall, however, the situation for many saproxylic insects and especially their parasitoids is worrying. This highlights the need for an increased level of knowledge of the parasitoids of saproxylic insects, not only as regulators of forest pests, but also as indicators of a sustainable forestry. In turn, this calls for easily accessible identification keys based on correct taxonomy for which basic taxonomic research is needed. These foundations are necessary for meaningful research into community structure or population dynamics of forest insects that must involve the trophic level of parasitoids.

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### Sammanfattning

De svenska arterna av släktet *Odontocolon* revideras. En ny art, *Odontocolon styx* **sp. nov.** beskrivs som ny för vetenskapen. *Odontocolon thomsoni* (Clément, 1938) **syn. nov.** synonymiseras med *Odontocolon appendiculatum* (Gravenhorst, 1829). Den förmodat sydeuropeiska arten *Odontocolon cretense* (Szépligeti, 1914) **stat rev.** exkluderas från synonymi med *Odontocolon appendiculatum* (Gravenhorst, 1829) och återinrättas som en god art. *Odontocolon geniculatum* (Kriechbaumer, 1889) exkluderas ur den svenska artlistan i frånvaron av korrekt bestämda beläggsexemplar. En illustrerad nyckel över de Nordeuropeiska arterna presenteras och arternas ekologi, karaktäristika och svenska utbredning kommenteras. En kort diskussion ges kring *Odontocolon*-arternas potentiella roll som indikatorer för skyddsvärda skogar och hållbart skogsbruk.