Review of the Swedish species of *Coleocentrus* Gravenhorst, 1829 (Hymenoptera: Ichneumonidae: Acaenitinae) with an illustrated key to the Western Palearctic species.

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Johansson, N & Wikars, L-O.: Review of the Swedish species of *Coleocentrus* Gravenhorst, 1829 (Hymenoptera: Ichneumonidae: Acaenitinae) with an illustrated key to the Western Palearctic species. [**Revision av de Svenska arterna av *Coleocentrus* Gravenhorst, 1829 (Hymenoptera: Ichneumonidae: Acaenitinae) med en illustrerad nyckel till arterna i västra palearktis**.] – Entomologisk Tidskrift 145 (3): 87–100. Uppsala, Sweden 2024. ISSN 0013-886x.

The Swedish species of *Coleocentrus* Gravenhorst, 1829 are revised and the study recognises five species as occurring in Sweden. *Coleocentrus borcei* Constantineanu, 1929 **syn. nov.** is synonymised with *Coleocentrus soleatus* Gravenhorst, 1829 and *Coleocentrus soldanskii* Bishoff, 1915 **syn. nov.** is synonymised with *Coleocentrus heteropus* Thomson, 1894. *Coleocentrus exareolatus* Kriechbaumer, 1894 and *C. soleatus* (Gravenhorst, 1829) are presented as new to Sweden, while *Coleocentrus croceicornis* (Gravenhorst, 1829) and the herein synonymized *C. soldanskii* are excluded from the Swedish checklist. An illustrated key to the Western Palaearctic species is provided.

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Coleocentrus Gravenhorst, 1829 (Figs 2–8) which belongs to the subfamily Acaenitinae is a relatively species-poor genus with about 25 species described worldwide (Yu et al. 2016). Members of the subfamily are most likely internal koinobiont parasitoids of coleopteran larvae (Broad et al. 2018, Shaw & Lyszkowski 2019). Many of the species are today considered to be rare or very rare (Broad et al. 2018, Zwakhals 1989) and the genus appears to have been rarely collected also historically (Thomson 1894). The ecology of *Coleocentrus* is still partly enigmatic and there are very few authenticated rearing records. The list of reputed host records (Yu et al. 2016) is quite long, and mainly consists of cerambycids and siricids. However, *Coleocentrus* species appear to attack hosts in rotten, moist wood and most evidence indicates that the hosts are probably found within the subfamily Lepturinae (Townes & Townes 1960, Shaw & Lyszkowski 2019, Jacek Hilszczanski pers. comm.). Apart from colour characters, the species are very similar in morphology and express a pronounced sexual dimorphism. This caused Gravenhorst (1829) to describe the males under the generic name *Macrus* and the females as

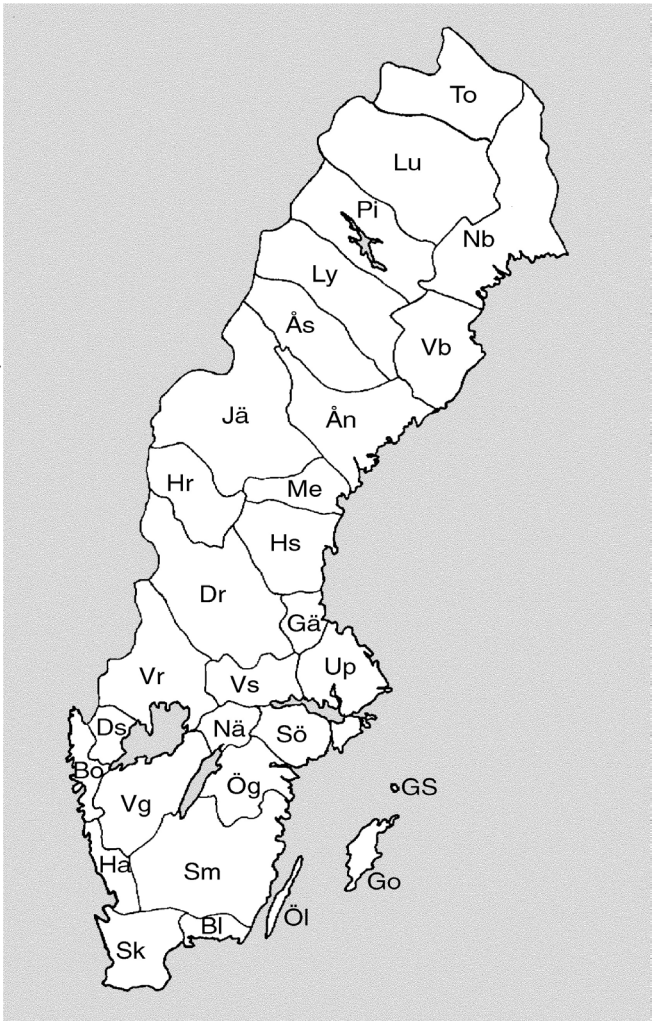

Figure 1. Map of Sweden with borders and used abbreviations for the faunistic provinces from south to north: Sk (Skåne), Bl (Blekinge), Ha (Halland), Sm (Småland), Öl (Öland), Go (Gotland), Ög (Östergötland), Vg (Västergötland), Bo (Bohuslän), Ds (Dalsland), Nä (Närke), Sö (Södermanland), Up (Uppland),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

Coleocentrus, a fact revealed a couple of decades later by Wesmael (1849). Holmgren (1860) made the first review of the Swedish species, listing *Coleocentrus excitator* (Poda, 1761) and *C. caligatus* Gravenhorst, 1829, while Thomson (1894) added his newly described *C. heteropus* Thomson, 1894. The Western Palaearctic Acaenitinae were reviewed by Aubert (1969). The relatively few British (Fitton 1981, Shaw 1986) and Dutch species (Zwakhals 1989) were revised during the 1980s, while Varga (2013) provided a review of the species occurring in the Carpathians, including an illustrated key to a majority of the Western Palaearctic species. A review and a key to the species of the Eastern Palaearctic was provided by Kasparyan & Khalaim (2007) and the Nearctic species were revised by Townes & Townes (1960). In this paper, we review the Swedish species of *Coleocentrus* adding two new species to the country, along with some taxonomic comments. We also present an illustrated key to all of the species of *Coleocentrus* occurring in the Western Palaearctic.

Material and methods

We studied material in the major public museums in Sweden as well as the collections of some private entomologists. Additional records, when possible to confirm, have also been extracted from the citizen science portal "Artportalen" (www.artportalen.se). As the description of most Western

Palearctic species are quite detailed and the fact that the primary types have been studied or commented on in recent revisions (Kasparyan & Khalaim 2007, Varga 2013), no particular effort was put into detecting and studying primary types. However, the types of *C. exareolatus* (Hungarian Natural History Museum, Budapest, Hungary), *C. soldanskii* (Museum für Naturkunde, Berlin, Germany) and *C. heteropus* (MZLU), have been studied in order to confirm their identity in relation to similar nominal species and their diagnoses.

We have tried to get access to the samples of Acaenitinae collected by the Swedish Malaise trap project (SMTP), in all five samples containing 1–2 individuals (Harald Havnås pers. comm). However, they were all on loan to other researchers and upon contacting them, it appears as if only one sample containing a single female of *Coleocentrus excitator* could be located. The generic and specific identity of the contents of the remaining samples therefore currently remain unknown.

Morphological terminology follows Broad et al. (2018). Known faunistic province records for Sweden is listed for each species according to the abbreviations given in Fig. 1. Pictures, if not stated otherwise, were taken by the first author with a Canon 6D, either with a Canon 35 mm f/2.8 Macrophoto lens or an Olympus 80mm f/4 macro lens mounted on bellows. Pictures were then stacked in Zerene stacker and post processed in Photoshop. Apart from specimens in the private collections of the authors (NJ & LW), the following public collections were examined:

NHRS = Swedish Museum of Natural history, Stockholm, Sweden
MZLU = Zoologiska Museet, Lunds Universitet, Lund, Sweden
UPSZ = Evolutionsmuseet, Uppsala University, Uppsala, Sweden
UPSLU = Sveriges Lantbruksuniversitet, Uppsala, Sweden

Illustrated key to the Western Palaearctic Coleocentrus.

Female Acaenitinae are readily identified by their long and pointed hypopygium (Fig. 8E). The males are harder to characterize, but can be identified by the key to subfamilies given by Broad et al. (2018). *Coleocentrus* is separated from other Acaenitinae in the Western Palaearctic by the simple claws of the front and middle tarsus, the nervellus of the hind wing being intercepted by the discoidella distinctly above the middle and the clypeus having a central tubercle. The female hypopygium in *Coleocentrus* is strongly elongate, about 3.5–4.0 times longer than wide, a feature only found in *Mesoclistus*, which has the nervellus intercepted in the middle. Furthermore, *Mesoclistus* appears to be a very rare in Fennoscandia (Roman 1931, Koponen et al. 2008, records in NHRS) and confined to alpine areas where *Coleocentrus* appears to be absent.

1. Fore wing with areolet entirely absent (Fig. 4C); face in both sexes entirely black; hind coxa entirely reddish……....*C. exareolatus* Kriechbaumer, 1894
- Fore wing with areolet present (but see *C. heteropus*); face in female frequently and in male always with pale markings; hind coxa various…….……2

2. Females (ovipositor present)……...3
- Males……..7

3. Hind tarsomeres pale; pterostigma evenly translucent and yellow-brown; hind coxae entirely black (Fig. 5C). A relatively common species…….*C. excitator* (Poda, 1761)
- Hind tarsomeres dark; pterostigma entirely or partly blackish; hind coxae varying from red to black. Rare species……..……4

4. Trochanters and trochantelli blackish; tergites (2)3–6 black with hind margins reddish laterally (Fig. 8A,E)……..……*C. soleatus* (Gravenhorst, 1829)
- Trochanters and trochantelli orange; tergites with different colour pattern ……..5

5. Upper margin of the hypopygium strongly sinuous, conspicuously widened in front of the narrow tip (Fig. 3A)……..……*C. croceicornis* (Gravenhorst, 1829)
- Upper margin of hypopygium almost straight (as in Fig. 8E)……..6

6. Coxae orange, at most narrowly blackish basally; pale facial markings, if present, closer to the compound eye than the centre of the face (Fig. 2B)……*C. caligatus* Gravenhorst, 1829
- Coxae extensively blackish basally or entirely black; pale facial markings, if present, closer to the centre of the face than the compound eye (Fig. 7A–B)……*C. heteropus* Thomson, 1894

7. Metasoma partly red; hind tarsomeres usually partly pale (Figs 5C, 8C)……..8
- Metasoma black; hind tarsomeres blackish……..……..10

8. Face centrally black with only the inner orbits widely yellow (Fig. 3B); hind tarsomeres brownish……
……..…*C. croceicornis*
- Face entirely yellow; hind tarsomeres partly yellow……..9

9. Hind tarsomeres 3–5 yellow; hind trochanter and trochantellus orange, partly blackish; face in studied specimens entirely yellow (Fig. 8D)……..*C. soleatus*
- Hind tarsomeres 1–5 yellow; hind trochanter and trochantellus mostly yellow; face yellow with a median black stripe in the upper part (Fig. 5D)……*C. excitator*

10. Face centrally black, with the inner orbits yellow (Fig. 2D)……..*C. caligatus*
- Face centrally pale (Fig. 6D)……*C. heteropus*

Results

***Coleocentrus caligatus* Gravenhorst, 1829**
Coleocentrus caligatus Gravenhorst, 1829
Coleocentrus maximus Rudow, 1881

Fig. 2A–D

Material examined
15 ♀♀, 18 ♂♂

Diagnosis
This is usually the largest species of the genus with the female (excluding the ovipositor) often exceeding 30 mm in body length. Both males and females have the meso- and metasoma entirely black and the coxae red, and rarely have paler brownish areas along the hind margins of the tergites and the central part of the hypopygium. Females from southern Sweden usually have two yellowish stripes slightly diverging ventrally from the inner margin of the compound eye on each side of the face (Fig. 2B), but in northern specimens these marks are usually entirely absent. The male differs from similar dark coloured species, especially *C. heteropus*, by having the yellow markings of the face restricted to the inner orbits (Fig. 2D).

Ecology
Reared from *Necydalis major* on *Populus tremula* L. (Lundblad 1955) and *Salix* L. (Jacek Hilszczanski pers. comm.). In Sweden collected on dead trunks of aspen and common alder *Alnus glutinosa* (L.) Gaertn. The sheer size (this is generally the largest species of the genus) of the species indicates that large cerambycids are used as hosts. Possibly mainly specialized on *Necydalis major* in Sweden. Recent observations in Sweden are of specimens collected in window and malaise traps. Five observations are from near natural forests, where deciduous trees were established after fires in the late 19th century (all situated in protected areas),

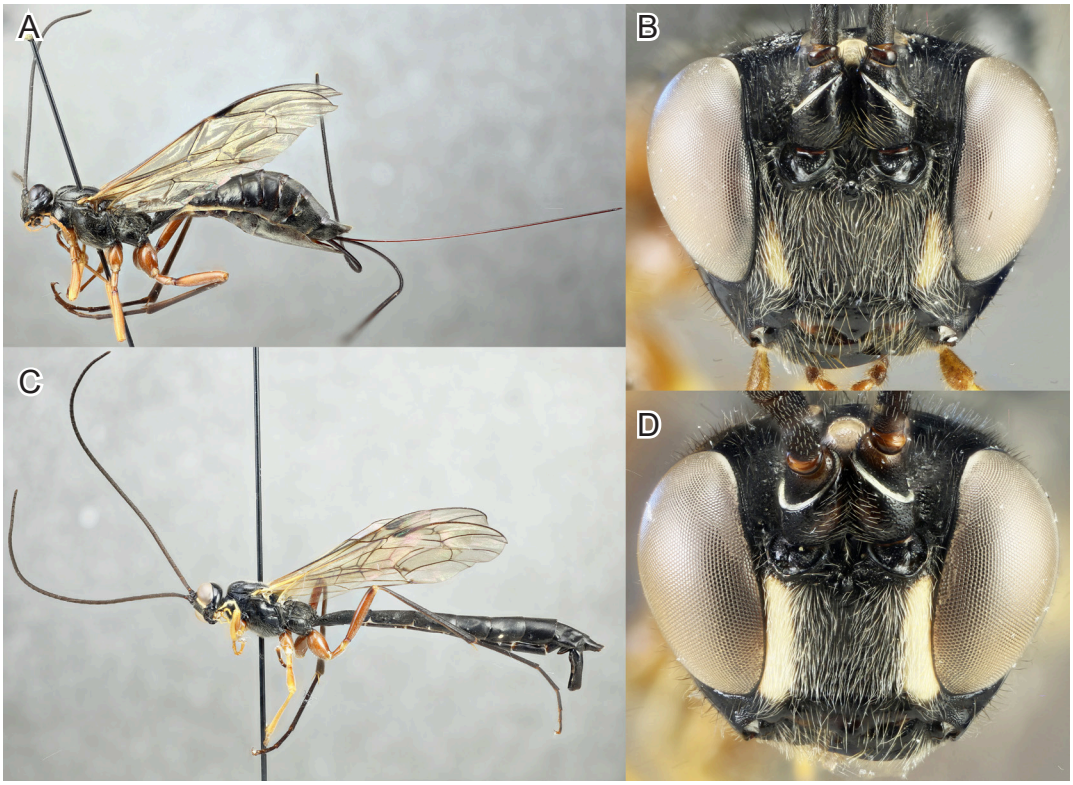

Figure 2. *Coleocentrus caligatus* Gravenhorst, 1829. – A) Female habitus, lateral view; – B) female face, anterior view; – C) male habitus, Lateral view; – D) male face, anterior view.

Figur 2. *Coleocentrus caligatus* Gravenhorst, 1829. – A) Hona, sidovy; – B) Hona, ansikte framifrån; – C) Hane, sidovy; – D) Hane, ansikte framifrån.

and two observations are from mosaic landscapes closer to agricultural land, rich in deciduous trees.

Distribution in Sweden
Quite rare, but widespread in Central Sweden: Sm, Ög, Sö, Up, Vs, Gä, Dr, Hs. Thomson (1894) mentions records from northern Sweden, but we have found no specimens in his or other collections to support this claim.

Remarks
Red-listed in Finland as near threatened NT (Hyvärinen et al. 2019) but multiple new records from sun-exposed *Salix* trunks shows that the species has been partly overlooked (Juuso Paappanen pers. comm.). Only recently recorded from Norway based on an old specimen in the Natural History Museum, University of Oslo, collected in 1906 (Humala & Reshchikov 2014). In the key to the species of *Coleocentrus* provided by Varga (2013), the male of *C. caligatus* is defined as having the face entirely pale and the hind coxae partly black (possibly due to a mixup with the male of *C. heteropus).*

Coleocentrus croceicornis (Gravenhorst, 1829)
Macrus croceicornis Gravenhorst, 1829

Fig. 3A–B

Material examined
2 ♀♀



Figure 3. *Coleocentrus croceicornis* (Gravenhorst, 1829), – A) Hypopygium of female, lateral view; – B) male head, anterior view. Photos: Gavin Broad

Figur 3. *Coleocentrus croceicornis* (Gravenhorst, 1829), – A) Hypopygium hos honan, sidovy; – B) huvud hane framifrån, . Foton: Gavin Broad.

Diagnosis
Coleocentrus croceicornis superficially resembles *C. soleatus*. However, the female of *C. croceicornis* is easily distinguished from other species by the deeply emarginate upper margin of the hypopygium. The male is characterized by the partly red metasoma in combination with the centrally black face.

Ecology
According to Jacek Hilszczanski (pers. comm), *Coleocentrus croceicornis* has been collected in yellow pan traps mounted on oak. Three British males were collected in the New Forest, an area renowned for its old oaks in 1960 (Fitton 1981) since when the species has not been seen in Britain. A possible association with cerambycids connected to ancient woodlands and decaying oak is likely.

Distribution in Sweden
No Swedish records (see Remarks). Known from Britain, Poland and Germany and always rare. Presuming a connection to ancient woodlands with oaks, the species should be sought in suitable areas in the southeastern parts of Sweden.

Remarks
Until recently, *Coleocentrus croceicornis* also included the taxon *C. soleatus* (*C. soleatus* was reinstated by Kasparyan & Khalaim (2007)) and any reference prior to 2007 may refer to any of the two species. Listed from Sweden by Dalla Torre (1902) based on Holmgren (1860), but as the specimen quoted in that publication is from Norway, the presumed Swedish record appears to refer to a misunderstanding. Furthermore, we have studied the specimen in question in NHRS (Dovre, coll. Boheman) and it is a well-preserved male of *Coleocentrus soleatus*. Accordingly, *C. soleatus* should be added to the Norwegian checklist, while *C. croceicornis* is deleted. Previously listed records from Finland (Hellén 1937, 1940) have also been shown to refer to other species (Gergely Varkonyi pers. comm.) and therefore there appear to be no confirmed records of *C. croceicornis* from Fennoscandia.

***Coleocentrus exareolatus* Kriechbaumer, 1894**
Coleocentrus exareolatus Kriechbaumer, 1894. Holotype female in the Hungarian Natural History Museum, examined.

Fig. 4A–C

Material examined
2 ♀♀

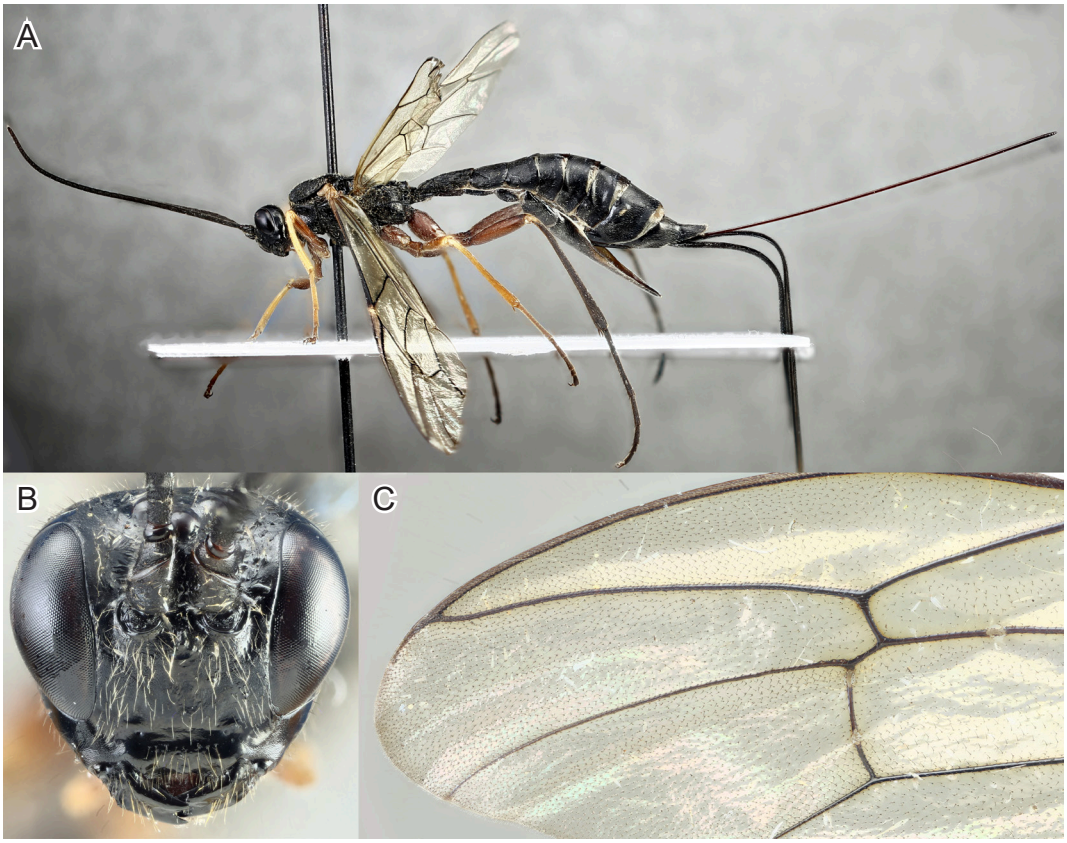

Figure 4. *Coleocentrus exareolatus* Kriechbaumer, 1894, female. – A) habitus in lateral view; – B) head in anterior view; – C) missing areolet of fore wing.

Figur 4. *Coleocentrus exareolatus* Kriechbaumer, 1894, hona. – A) sidovy; – B) ansikte framifrån; – C) avsaknad av areolet i framvinge.

Diagnosis

A mid-sized species with the areolet of the fore wing entirely absent (Fig. 4C) and the face in both female and male entirely black without pale markings. The female could potentially be confused with specimens of *C. heteropus*, which sometimes has the areolet of the fore wing partly or entirely open (Fig. 7E–F), but has the coxae evenly reddish, while they are more or less blackish at least basally in *C. heteropus*.

Ecology

No host records are known for this apparently rare species. One female was collected in the summer in a window trap mounted on a dead birch tree (*Betula pubescens*) with living sporocarps of the bracket fungus *Fomes fomentarius* in a rather closed mixed forest in a southwest-sloping old-growth forest. The forest is unprotected but borders to the nature reserve Storhuvudet (700 ha), which is known for its rich fauna of saproxylic insects associated with dead deciduous trees (Wikars 2008, Wikars & Hedenås 2010).

Distribution in Sweden

New to Sweden: 1 ♀, Norrbotten, Boden, Krokliden, Storhuvudets västsluttning, RT90 N.7327461, O.1757914 (±10m), window trap on dead birch – 20 cm diameter, 29 May–20 Jul. 2022, 151 m, P. Löfgren leg. The specimen will be depoaited at UPSZ.

Remarks
Apart from the absent areolet in the fore wing, *C. exareolatus* bears some superficial resemblance with *C. caligatus*. However, they clearly differ in the proportions of the head, which is rounder in *C. exareolatus* in anterior view (Fig. 4B) and the more distinct and coarse sculpture of the mesosoma and the tergites of *C. exareolatus*. Furthermore, material barcoded in the BOLD database (www.Boldsystems.org) clearly show that they represent two different and valid taxa. *Coleocentrus exareolatus* is red listed in Finland as regionally extinct (Hyvärinen et al. 2019). It has historically been recorded from the southern part of the country.

***Coleocentrus excitator* (Poda, 1761)**
Ichneumon excitator Poda, 1761
Lissonota segmentatrix Schulz, 1906
Macrus longiventris Gravenhorst, 1829
Ichneumon gigantor Thunberg, 1822
Ichneumon segmentator Fabricius, 1793

Fig. 5A–D

Material examined
62 ♀♀, 6 ♂♂

Diagnosis
Coleocentrus excitator can be quite abundant in suitable open mixed forests with large rotting tree trunks. The female is easily distinguished from other *Coleocentrus* by the wide pale membraneous hind margins of the tergites, the black coxae and the extensively pale hind tarsomeres. The male has the face entirely yellow apart from a central black stripe (Fig. 5D) and the metasoma partly red and is quite similar to the male of *C. soleatus*. However, it differs by having the hind tarsomeres 1–5 yellow, the hind trochanter and trochantellus partly yellow and a black stripe at the upper part of the face.

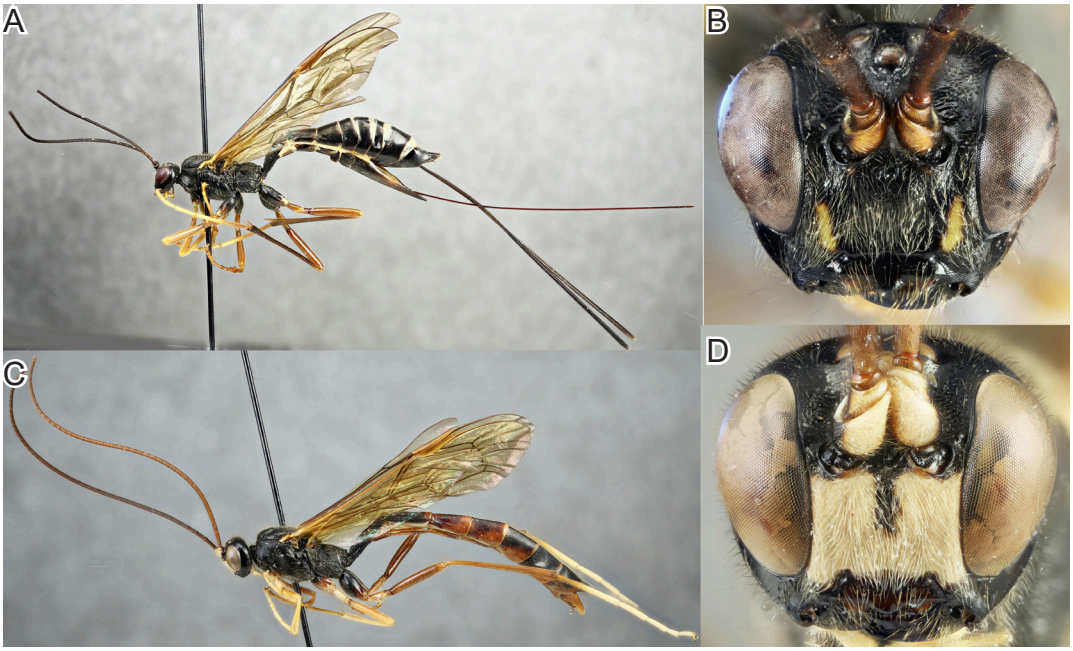

Figure 5. *Coleocentrus excitator* (Poda, 1761). – A) Female habitus, lateral view; – B) female face, anterior view; – C) male habitus, Lateral view; – D) male face, anterior view.

Figur 5. *Coleocentrus excitator* (Poda, 1761). – A) hona, sidovy; – B) hona, ansikte framifrån; – C) hane, sidovy; – D) hane, ansikte framifrån.

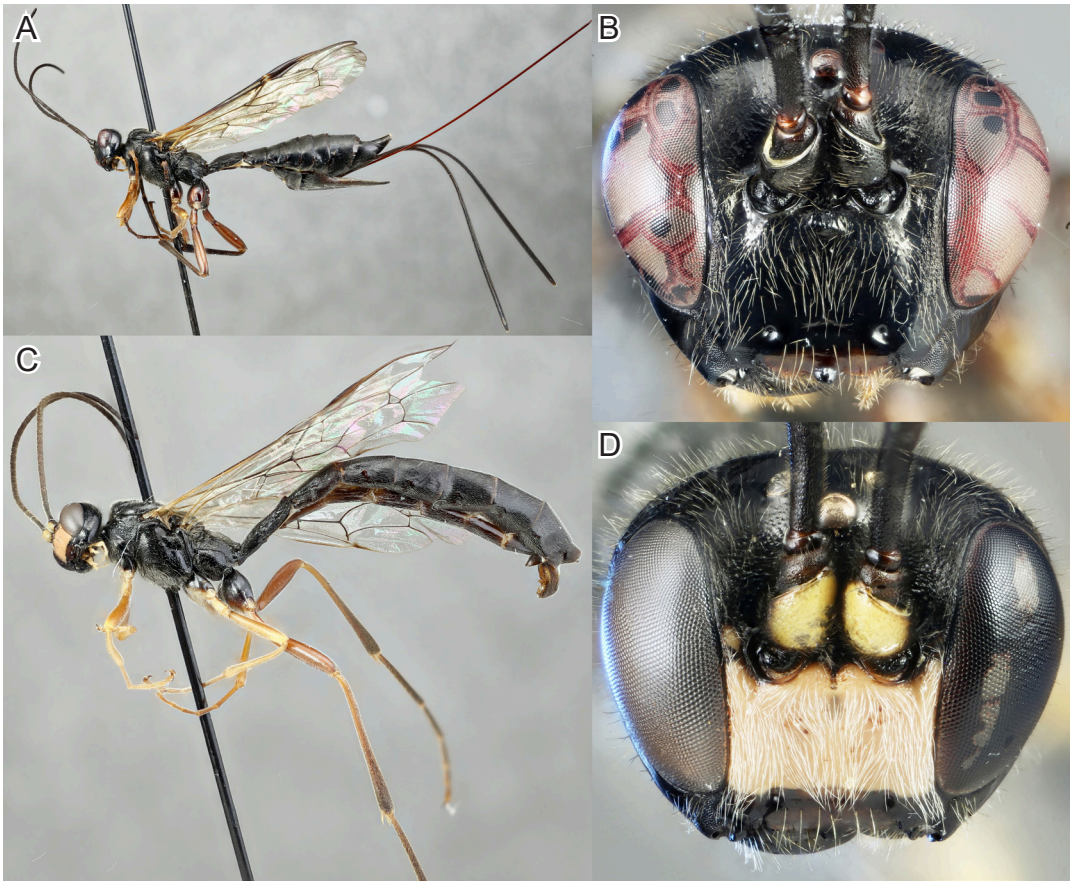

Figure 6. *Coleocentrus heteropus* Thomson, 1894. – A) Female habitus, lateral view; – B) female face (black form), anterior view; – C) male habitus, Lateral view; – D) male face, anterior view.

Figur 6. *Coleocentrus heteropus* Thomson, 1894. – A) Hona, sidovy; – B) hona, ansikte framifrån (svart form); – C) hane, sidovy; – D) hane, ansikte framifrån.

Ecology

Though there are no authenticated rearings of this species, there are several observations of the species ovipositing into rotten wood: "Ovipositing on dead leaning trunk of Scots pine", "Ovipositing into old tree stump", "Ovipositing into dead birch" (Artportalen.se) and based on observations, Shaw & Lyszkowski (2019) deduce that one host probably is *Leptura quadrifasciata* Linnaeus, 1758. The available evidence would indicate that *Coleocentrus excitator* parasitizes larvae of *Leptura* s. lat., in particular *Leptura quadrifasciata* and *Stictoleptura rubra* (Linnaeus, 1758).

Distribution in Sweden

Without comparison the most common species in the genus, but generally local in its occurrence, and primarily found in regions where deciduous trees are more abundant. Recorded from Sk, Bl. Ha, Sm, Öl, Vg, Ög, Vs, Vr, Dr, Gä, Hs, Ån, Vb, Nb, Ås, To.

***Coleocentrus heteropus* Thomson, 1894**

Coleocentrus heteropus Thomson, 1894

Holotype female (type no 3817:1) in MZLU, examined

Coleocentrus soldanskii Bischoff, 1915 **syn. nov.**

Type female (holotype by monotypy): MfN, URI: http://coll.mfn-berlin.de/u/09f288, and an additional female in coll. Bishoff MfN URI: http://coll.mfn-berlin.de/u/09f369 , examined.

Figs 6A–D, 7A–F

Material examined
11 ♀♀, 5 ♂♂

Diagnosis
Coleocentrus heteropus is distinguished by the generally black body in combination with the more or less blackish coxae and legs (Fig. 6). The female can have the face entirely black or with two yellowish pale, spots or stripes situated close to the central part of the face (Fig. 7A–C). The male is one of three species in the Western Palaearctic with black metasoma and is characterized by the entirely pale face (Fig. 6D), while *Coleocentrus exareolatus* has the face entirely black and *C. caligatus* only the inner orbits white (Fig. 2D).

Ecology
The few recent records in Sweden are all from specimens collected in window traps in near natural forests, mostly open pine-forests, including recently burned forest in two cases, within or very close to protected forests. In one case collected on artificial high stumps of Scots pine (*Pinus sylvestris*) created in a project aiming to mimic natural disturbance regimes in so called "Eco-parks". Two records are from spruce (*Picea abies*), including one presumed rearing from spruce bark. The observations suggest that *C. heteropus* develops on one or several hosts living between bark and wood in recently killed conifers. Some recent records from Finland are from rather trivial, light pine forests (J. Paappanen pers. comm.).

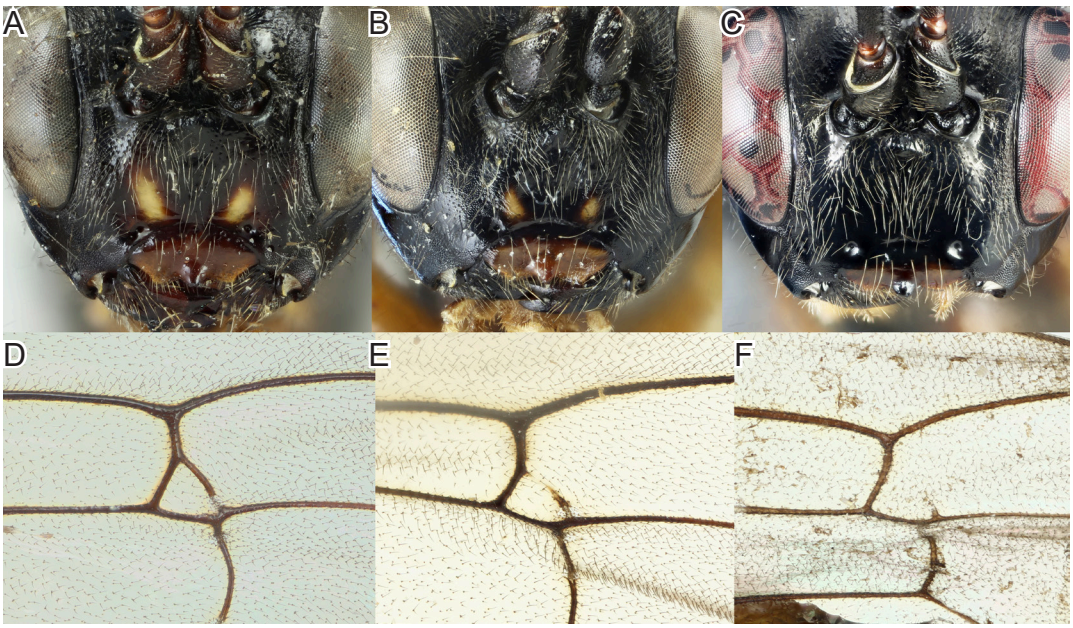

Figure 7. *Coleocentrus heteropus* Thomson, 1894, variation of the colour pattern of the female face and the 3rs-m vein. A–C) Head in anterior view; – D–F) areolet of fore wing

Figur 7. *Coleocentrus heteropus* Thomson, 1894, variation i honans ansiktsfärg och 3rs-m vingribba. A–C) Huvud framifrån; – D–F) areolet i framvinge.

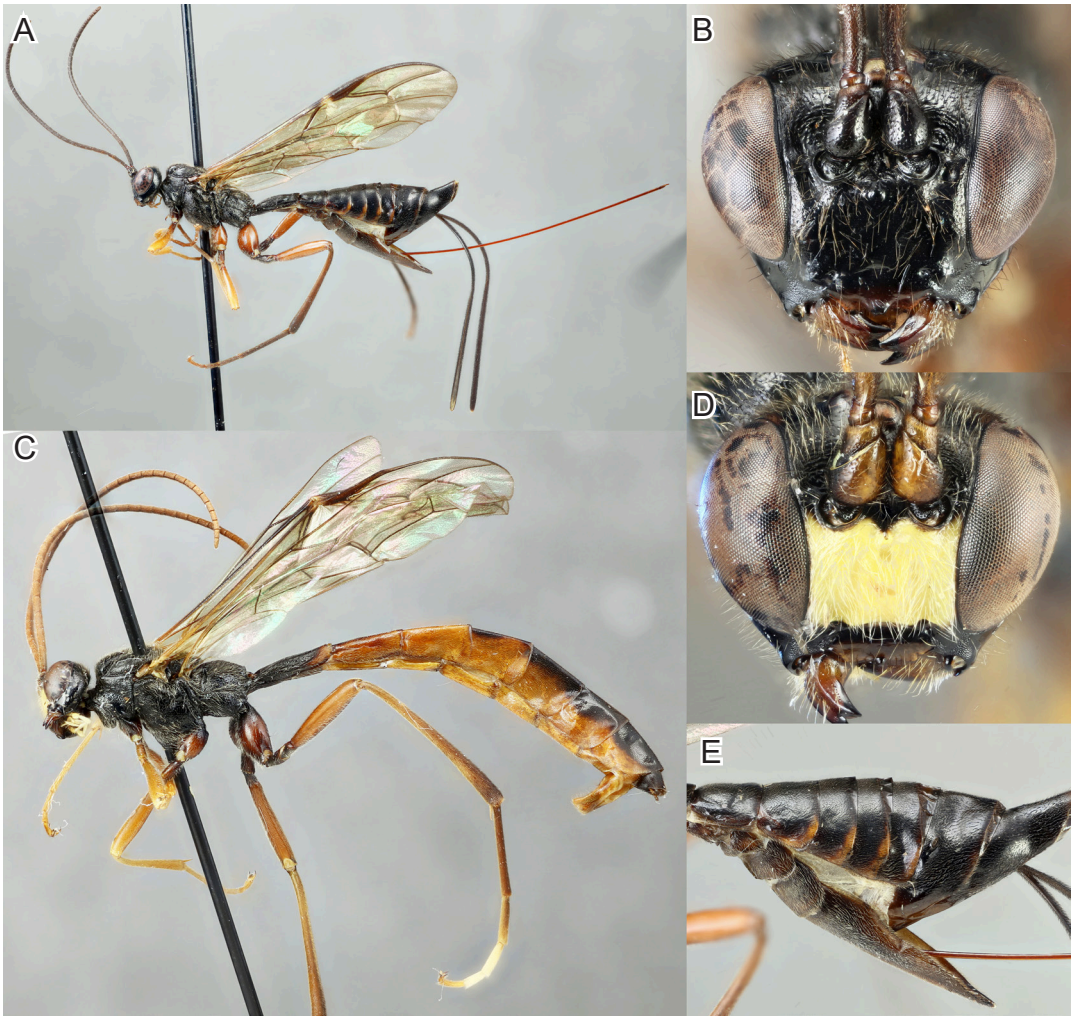

Figure 8. *Coleocentrus soleatus* (Gravenhorst, 1829). – A) Female habitus, lateral view; – B) female face, anterior view; – C) male habitus, Lateral view; – D) male face, anterior view; – E) female, posterior part of metasoma, lateral view.

Figur 8. *Coleocentrus soleatus* (Gravenhorst, 1829). – A) Hona, sidovy; – B) hona, ansikte framifrån; – C) hane, sidovy; – D) hane, ansikte framifrån; – E) hona, bakre del av bakkroppen i sidovy.

Distribution in Sweden

Described from Småland in southern Sweden, where it appears to have become extinct. One record is from Tullinge in Södermanland 1951. Modern records (all after 2015) are from central Dalarna and northwards: Sm, Sö, Dr, Nb, Ås, Lu.

Remarks

Coleocentrus soldanskii, described by Bishoff (1915) agrees entirely with *C. heteropus* with exception of, according to the description, the absent areolet of the fore wing. Apart from the single type specimen and one additional female in coll. Bishoff, *C. soldanskii* has only been recorded from Poland (Kazmierczak 2004) but we have not been able to verify this record. The Swedish (unpublished) record of *C. soldanskii* is based upon a specimen in UPSZ in the Mattias Idar collection, determined by Idar himself (Fig. 7B, F). When studying Swedish specimens of *Coleocentrus he-*

teropus it becomes evident that the extension of the pale facial markings in the female (Fig. 7A–C), as well as the presence of the vein 3rs-m delimiting the fore wing areolet (Fig. 7D–F) is highly variable, and therefore we conclude that *C. soldanskii* represents a slightly aberrant specimen of *C. heteropus*. Of the two Bishoff specimens in Berlin, the type has the areolet open as in Fig. 7F, while the non-type female (collected by Bischoff in 1929) has the areolet closed, as in Fig. 7D. Accordingly, *Coleocentrus soldanskii* Bischoff, 1915 syn. nov. is regarded as a junior synonym of *Coleocentrus heteropus* Thomson, 1894. *Coleocentrus heteropus* is red-listed in Finland as endangered EN (Hyvärinen et al. 2019).

***Coleocentrus soleatus* (Gravenhorst, 1829)**
Macrus soleatus Gravenhorst, 1829
Coleocentrus borcei Constantineanu, 1929 **syn. nov.**

Fig. 8A–E

Material examined
4 ♀♀, 2 ♂♂

Diagnosis
Coleocentrus soleatus is usually the smallest of the Western Palaearctic species and the studied females range from 15 to 20 mm in body length, excluding the ovipositor. The species is quite similar to *C. croceicornis*, but the female has the upper margin of the hypopygium almost straight (Fig. 8E), not strongly undulating as in *C. croceicornis* (Fig. 3A). The male is similar to the common *C. excitator*, but has only the hind tarsomeres 3–5 yellow (Fig. 8C) and the trochanter and trochantelli orange with infuscate areas, while tarsomeres 1–5 are pale and the trochanter and trochantelli largely yellow in *C. excitator* (Fig. 5C). The face in the male of *C. soleatus* also usually appears to be entirely yellow (Fig. 8D), while it has a central black stripe centrally in the upper part in *C. excitator* (Fig. 5D).

Ecology
No authenticated rearing records are known for this species. The main period of activity appears to be in early summer. The known localities are all close to lakes, swamps or larger rivers.

Distribution in Sweden
So far only recorded in the province of Småland in the municipalities Högsby and Nybro in an area known for its high diversity of saproxylic insects. New to Sweden: 2 ♀♀, Småland, Högsby, Ryngen, emptied 8 Jul. 2021, Malaise trap, Michael Tholin leg; 1 ♀, Småland, Högsby, Mjösingsmåla, 1 May–1 Sep. 2014, RT90 6314326/1516736, Malaise trap, N. Johansson leg.; 1 ♀, Småland, Nybro, Bjällingsmåla, 12–24 May 2015, RT90 6311666/1506323, Malaise trap, N. Johansson leg.; 1 ♂, Småland, Nybro, Bjällingsmåla, 12 Jun. 2015, RT90 6311666/1506323, sweepnet, N. Johansson leg. All specimens are deposited in the collection of Niklas Johansson.

Remarks
As the type of *Coleocentrus borcei* Constantineanou, 1929, collected in Romania is, not only in bad shape due to dermestid damage, but also currently inaccessible (Varga 2017) we have not been able to study it. However, as the colour characters defining the species (Constantineanou 1929) fits within the variation of the females of *C. soleatus* studied by us, it is presumed that they represent the same species and therefore *Coleocentrus borceii* Constantineanu, 1929 syn. nov. is regarded as a junior synonym of *Coleocentrus soleatus* (Gravenhorst, 1829).

Discussion
Despite their size, the determination of the species of *Coleocentrus* is not entirely straightforward. Apart from the differences in colour, they show very little morphological differentiation regarding sculpture and proportions. The fact that the colour pattern appear to be somewhat variable, with specimens from more northerly latitudes having the pale markings reduced or absent, may therefore cause some confusion. Hopefully the key presented here has catered for any variation that might occur. This variation, along with the strongly pronounced sexual dimorphism, has also led to the establishment of numerous synonymies of which two additional ones are proposed in this study, reducing the number of species known from the Western Palaearctic from eight to six.

Coleocentrus were obviously rarely collected up until the end of the 19th century (Thomson 1894). Despite today's extensive use of window- and

Malaise traps, all of the species, with the exception of *C. excitator*, appear to be rare and local in their occurrence. Given the evident data deficiency surrounding the ecology and distribution of most species, it is hard to draw any definitive conclusion regarding their conservation status. However, it is striking that the occurrence of most species are in areas with an abundance, as well as continuity of dead wood, and having a correspondingly rich fauna of saproxylic insects. This suggests that some *Coleocentrus*-species will qualify for the upcoming Swedish red list.

For species such as *Coleocentrus heteropus* and *C. exareolatus*, which appear to have a more pronounced northern distribution in boreal forests, the present shortage of protected areas and the ongoing clear-cutting of the taiga below the high latitude forests has most likely caused the populations to be fragmented and thereby more prone to extinction.

Another problem when it comes to assessing the status of *Coleocentrus*, is the apparent lack of ecological observations and the fact that authenticated rearing records are only known for a couple of species. We hope that this paper may help raise the awareness of their existence among coleopterists and researchers focusing on boreal ecosystems, which in the end will provide new information of their ecology and distribution.

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Sammanfattning

Brokparasitstekelsläktet *Coleocentrus* Gravenhorst, 1829 inom den relativt artfattiga underfamiljen spetsgumpsteklar Acaenitinae, består av stora arter som parasiterar larver av vedlevande långhorningar. Släktet revideras i denna studie och fem arter konstateras vara kända från Sverige: *C. caligatus* Gravenhorst, 1829, *C. exareolus* Kriechbaumer, 1894, *C. excitator* (Poda, 1761), *C. heteropus* Thomson, 1894 och *C. soleatus* (Gravenhorst, 1829). Två nya synonymer konstateras: *C. soldanskii* Bishoff, 1915 syn. nov. är en synonym till *C. heteropus* och *C. borcei* Constantineanu, 1929 syn. nov. är en synonym till *C. soleatus*. Tidigare uppgifter om fynd av *C. croceicornis* (Gravenhorst, 1829) i Sverige och resten av Norden baseras på en tidigare sammanblandning av denna art och *C. soleatus*. Samtliga arter inom släktet *Coleocentrus* är intressanta som indikatorer för värdefull skog och några av dem kommer sannolikt att rödlistas i framtiden. En illustrerad bestämningstabell för släktet *Coleocentrus* i Västra Palaearktis presenteras.