

On the presence of *Colletes hederæ* SCHMIDT & WESTRICH and *C. brevigena* NOSKIEWICZ (Hymenoptera, Colletidae) in Serbia

Par Ronald BURGER *

Abstract. In Autumn 2007 and 2008, I found *Colletes hederæ* SCHMIDT & WESTRICH 1993 in the province of Vojvodina, Serbia. This species had never been found previously in this country and this record indicates that this bee is likely to be more widespread in Southeastern Europe than previously thought. An updated distribution map of the species is given, as well as diagnostic morphological characters to separate *C. hederæ* from another one of its sister species found in the study area, *C. brevigena* NOSKIEWICZ 1936.

Résumé. Au cours des automnes 2007 et 2008, j'ai capturé des spécimens de *Colletes hederæ* SCHMIDT & WESTRICH 1993 dans la province de Voïvodina en Serbie. Cette espèce n'avait jamais été capturée auparavant dans ce pays et il semble donc que sa distribution dans le sud est de l'Europe soit plus importante que ce qui avait été estimé jusqu'ici. Je fournis une mise à jour de la carte de distribution de l'abeille du lierre en Europe ainsi que des caractères morphologiques diagnostiques pour séparer *C. hederæ* de *C. brevigena* NOSKIEWICZ 1936, une autre espèce-soeur que l'on rencontre sur les mêmes sites dans la région étudiée.

Mots-clés. *Colletes hederæ*, *Colletes brevigena*, distribution géographique, différenciation morphologique.

Introduction

The bee fauna of Serbia is poorly investigated. Old records date back to the late 19th century, when the Hungarian entomologist Alexander (Sándor) Mocsáry collected in «southern Hungaria» or when the German apidologist Heinrich Friese collected some thousand bees at locations in the Pannonian region of the Austrian-Hungarian monarchy which are now partly belonging to Romania and northern Serbia. In his work *Apidae Europaeae*, Friese (1895-1901) mentions several sites from «southern Hungaria» where he observed long series of rare bee species.

The changes in land use after the First World War following from the peace treaty of Trianon in 1920, the foundation of Yugoslavia after the Second World War, and finally the splitting of Yugoslavia into several new countries since 1992 make it a daunting task to match most of the historical records with the locality names in the new countries. Luckily, some of these locations can still be tracked down nowadays by the names of the neighbouring settlements: one of these apparently spectacular places is known as the sand dunes of «Deliblatska pescara» («Deliblater Sande»/«deliblato sands») in the Banat of the Serbian province Vojvodina.

Besides, the recent taxonomic changes in the fauna of wild bees in Europe call for a reassessment of national checklists. The presence of species that have been recently described like *Colletes hederæ* SCHMIDT & WESTRICH 1993 or that have been given the rank of

valid species like *C. brevigena* NOSKIEWICZ 1936 need to be investigated further in Serbia and adjacent areas.

New serbian records

Colletes hederæ has only recently been regarded as a valid species after having been merged with *C. succinctus* (LINNÉ 1785). Following its description, a fast-growing number of records have flowed in from different countries in South-western part of middle Europe (Schmidt & Westrich 1993; summarised by Vereecken et al. 2009). The northernmost findings are known from England and southern Netherlands, and the easternmost findings are known from Greece (Vereecken et al. 2009).

On October 4, 2007 I found specimens of *Colletes hederæ* in the Province of Vojvodina, Northern Serbia. The specimens collected were on the wing in the city of Novi Sad at several locations in the city center, in the surroundings of an old catholic graveyard and in the city of Petrovaradin near the fortress, opposite to Novi Sad on the Danube river bank. All the specimens collected were visiting inflorescences of Ivy (*Hedera helix*, Araliaceae) at the time of the observations.

One year later, on August 30 and September 30 2008, I collected more specimens in the same province on the «Fruska Gora» mountain range in Sremski Karlovci (4 FF, 1 MM leg & coll R Burger). The specimens were foraging in large numbers on *Reseda* sp. (Resedaceae) together with another sibling species of the *Colletes succinctus* group, *C. brevigena* NOSKIEWICZ 1936 (1 female leg & coll R Burger).

* Sonnenwendstr. 17b, D-67098 Bad Dürkheim, Germany. E-mail: burger@pollichia.de



Figure 1. Flying area of *C. hederæ* and *C. brevigena* in northern Serbia: Fruska Gora Mountains. A mosaic of Pannonic dry grasslands, fields with extensive agriculture on loess and forest. In background the Pannonian Plain (Photo R Burger).

Two years later, on October 2, 2010 at the same spot, *C. brevigena* was foraging on *Reseda* sp., (2 FF leg, det & coll R. Burger) and nesting in the ground of the slope near the path. Surprisingly, no *C. hederæ* were found on that day.

It is only recently that *C. brevigena* has been raised from the status of subspecies of *C. succinctus* to the rank of species (Kuhlmann 2000). This species is known from northern Iran, Caucasus, the Northwestern coasts of the Mediterranean Basin, from Turkey, Cyprus, Crete, Mallorca and from the Balkans in Southeastern Europe where it reaches Middle Europe in the (sub)pannonian part of Austria at the lake Neusiedl (Zettel et al. 2006; Ornosá & Ortíz-Sánchez 2004). In Southwestern Europe, *C. brevigena* is thought to be (at least partially) bivoltine with flight periods peaking in early summer and in Autumn. In Spain, specimens have been found as early as in May (Ornosá & Ortíz-Sánchez 2004), whereas in Austria it seems that it can only be found in late summer and autumn from late August to late September (Zettel et al. 2006). Likewise, in Serbia, my personal records indicate that *C. brevigena* can only be found in Autumn.

Investigations into the food plants of *C. brevigena* and *C. hederæ* indicate that females collect pollen from species belonging to different plant families (Zettel et al. 2006; Müller & Kuhlmann 2008; Westrich 2008). On the study site in northern Serbia, *C. hederæ* specimens were found to outnumber *C. brevigena* by a factor of 10-20 times.

Diagnostic characters of *C. hederæ* and *C. brevigena*

In the field, when flying together, both species are not easily to tell apart. The females of *C. hederæ* are very similar in size to *C. brevigena*. The punctuation of the cuticle of *C. brevigena* looks coarser, especially on the mesonotum. Although Ornosá & Ortíz-Sánchez (2004) indicate that the punctuation of the first tergite of *C. brevigena* is denser and stronger than in *C. hederæ*, I found the differences hardly noticeable. By comparing the specimens of both species from Serbia, it seemed almost impossible to tell them apart using this criterion. Zettel et al. (2006) report the same fact by comparing specimens of *C. hederæ* with those of *C. brevigena* from Austria. But one reliable diagnostic character seems to be the difference in the structure of carvings on the clypeus of the females: females of *C. hederæ* have almost no longitudinal carvings on clypeus, whereas *C. brevigena* have hardly no carvings going toward the median area (Figure 2). Females of *C. succinctus*, another species of the *C. succinctus* group, have intermediate characters between *C. hederæ* and *C. brevigena*: their clypeus is characterised by more or less straight carvings going towards the middle in the lower third of the clypeus. But females of *C. succinctus* can easily be separated from *C. brevigena* by looking at the galea: like that of *C. hederæ*, the galea of *C. brevigena* has microsculptures, whereas the galea of *C. succinctus* is shiny. Consequently, the structure of the clypeus and the galea seem to be very useful to separate the females of *C. hederæ*, *C. brevigena* and *C. succinctus*.



Figure 2. Detail of clypeus of a *Colletes brevigena* female from Northern Serbia (Fruska Gora, forehills)

Discussion

As mentioned above, *C. hederæ* has been reported until now mostly from Southwestern Europe (Figure 3). Records from 2009 indicate that *C. hederæ* has reached both eastern (Mazucco & Hölzler 2010) and southeastern Austria (Teppner et al. 2009).

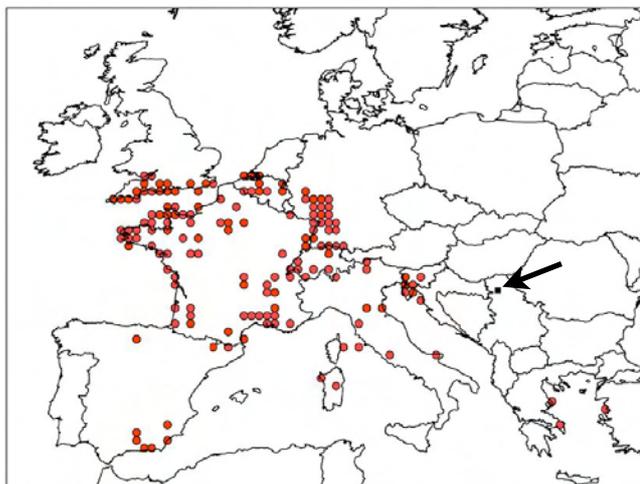


Figure 3. Updated distribution map of the Ivy bee, *Colletes hederæ*, modified after Vereecken et al. (2009). The black arrow on the right side of the distribution map indicates the location of the study sites in Serbia.

The Ivy bee is not known from the Pannonian Basin. The nearest findings are in the Mediterranean on the coast of Slovenia and Croatia (Vereecken et al. 2009) or the new records from Austria (Teppner et al. 2009; Mazucco & Hölzler 2010) – both more than 400 km away. The confirmed presence of *C. hederæ* in northern Serbia indicates that this species is able to get along with more continental climate (especially cold winters). So far, the Ivy bee has not been reported from Hungaria (Zolt 2001), Romania or from Slovakia, for which an updated checklist of bees is available (Straka et al. 2007). The findings in Croatia and Slovenia on the coast of the Adriatic Sea belong to the Mediterranean climate.

Although the continental climate in northern Serbia is moderate and the winter is not very severe, with an average of 22 days of sub-zero temperature, the temperatures can go down to -30°C . The average annual temperature is around 11°C and annual precipitation is around 600mm. These factors are undoubtedly of importance for bees that are flying in late summer, and early autumn as they need a long enough flight season with enough sunny and warm periods. Around Novi Sad the month of September is typically very mild with only very little rain according to the local Rimski Sancevi meteorological station.

In a recent article, Frommer (2010) compared the distribution of *C. hederæ* in Europe with the occurrence of the flowering form (f. *arborea*) of *Hedera helix*. He showed that Ivy has a distribution in the Pannonian Basin restricted to certain areas where winter is not too long and severe for this plant to produce the blossoming form, unlike in the high regions of the Alps and the Pyrenees for example. The first findings of *C. hederæ* in Serbia are made on flowering Ivy in the urban area of Novi Sad and on the fore slopes of the «Fruska Gora» mountains. As mentioned above the females of *C. hederæ* foraged there on *Reseda* sp. together with the females of *C. brevigena*.

Teppner et al. (2009) reported on females of *C. hederæ* in Graz (southeastern Austria) cleaning themselves completely of pollen and seemed to forage on Ivy sometimes mainly for nectar. The authors explain this behaviour with the fluid consistence of the larval-food of *Colletes* for which more nectar is needed. According to this, nectar could be the limiting factor for *C. hederæ*, too, (Teppner et al 2009)

Frommer (2010) hypothesised that since *C. hederæ* females rely largely (but not exclusively, see Müller & Kuhlmann 2009) on flowering Ivy as pollen source, the distribution of the Ivy bee in Europe is likely to be restricted to the area west of the reduced -2°C January isotherm. Going from western Poland to Hungary (East of Budapest) and from there eastwards across Romania to the Black Sea, close to the Bulgarian border. My records of *C. hederæ* in Serbia are located west of this line and therefore seem to support Frommer's (2010) hypothesis. I am quite confident that *C. hederæ* is present on more locations in northern Serbia and even on more places in southeastern Europe (around). Entomologists should keep their eyes peeled for the Ivy bee in Hungary, Slovakia, and Romania where the natural conditions seem to fit to the needs of *C. hederæ*.

Acknowledgements

I am grateful to M Kuhlmann (London, UK) for his help with the identification of the specimens collected, and to NJ Vereecken (Brussels, Belgium) for his editorial help during the preparation of this article.

Literature cited

- Bischoff I, Feltgen K & Breckner D, 2003.** Foraging strategy and pollen preferences in *Andrena vaga* (PANZER) (Hym. Andrenidae) and *Colletes cunicularius* (L.) (Hym. Colletidae). *Journal of Hymenoptera Research* 12 (2): 220-237
- Friese H, 1894-1901.** *Die Bienen Europas (Apidae europaea), nach ihren Gattungen, Arten und Varietäten auf vergleichend morphologisch-biologischer Grundlage*, Vol. 1-6, Friedländer (Berlin) Vol. 1-3; Lampe (Innsbruck) Vol. 4-5, Selbstverlag (Innsbruck) Vol. 6).
- Frommer U, 2010.** Beobachtungen zum Ausbreitungsmodus der Efeu-Seidenbiene *Colletes hederæ* SCHMIDT & WESTRICH, 1993 (Hymenoptera, Apidae) in Hessen und die Bedeutung des blühenden Efeus (*Hedera helix* L.). *Hessische Faunistische Briefe* 29(1): 1-20.
- Kuhlmann M, 2000.** Katalog der paläarktischen Arten der BienenGattung *Colletes* LATR., mit Lectotypenfestlegungen, neuer Synonymie und der Beschreibung von zwei neuen Arten (Hymenoptera: Apidae: Colletinae). *Linzener biologische Beiträge* 32(1): 155-193.
- Mazzucco K & Hölzler G, 2010.** Drei für Österreich neue Bienenarten. *Linzener biologische Beiträge* (in press).
- Móczár M, 1960.** Ósméhek, Földiméhek (Colletidae, Melitidae). In: *Magyarország Állatvilága* 51 (*Fauna Hungariae*), XIII/9: 1-64, Budapest.
- Müller A & Kuhlmann M, 2008.** Pollen hosts of western palaeartic bees of the genus *Colletes* (Hymenoptera: Colletidae): the Asteraceae paradox. *Biological Journal of the Linnean Society* 95: 719-733.
- Ornosa C & Ortiz-Sanchez FJ, 2004.** *Hymenoptera, Apoidea 1*. In: *Fauna Ibérica* Vol. 23, Ramos, M.A. et al (ed). Museo Nacional de Ciencias Naturales. CSIC, Madrid.
- Schmidt K & Westrich P, 1993.** *Colletes hederæ* n. sp., eine bisher unerkannte, auf Efeu (*Hedera*) spezialisierte Bienenart (Hymenoptera: Apoidea). *Entomologische Zeitschrift* 103 (6): 89-112.
- Straka J, Bogusch P & Přidal A, 2007.** Apoidea: Apiformes. Pp. 241-299. In: Bogusch, P., Straka, J. & Kment, P. (eds.): *Annotated checklist of the Aculeata (Hymenoptera) of the Czech Republic and Slovakia*; Acta Entomologica Musei Pragae, Supplementum 11: 1-300.
- Teppner, H, Hausl-Hofstätter, U, Brosch, U & Obermayer, W, 2009.** Plötzliches, häufiges Auftreten von *Colletes hederæ* / Efeu-Seidenbiene (Hymenoptera-Apoidea-Colletidae) im Stadtgebiet von Graz (Österreich) (Mit Notizen zur Anthese von *Hedera helix*). *Mitteilungen des naturwissenschaftlichen Vereins für die Steiermark* 139: 183-205.
- Vereecken NJ, Schwenninger H, Gogala A & Roberts SPM 2009.** Mise à jour de la distribution géographique de l'abeille du lierre, *Colletes hederæ* Schmidt & Westrich (Hymenoptera, Colletidae) en Europe, *OSMIA* 3: 2-3.
- Westrich P, 2008.** Flexibles Pollensammelverhalten der ansonsten streng oligolektischen Seidenbiene *Colletes hederæ* SCHMIDT & WESTRICH (Hymenoptera: Apidae). *Eucera* 2: 17-29.
- Zettel H, Ebmer AW & Wiesbauer H, 2006.** Zur Kenntnis der Wildbienen (Hymenoptera: Apidae) in Wien, Niederösterreich und dem Burgenland (Österreich). *Beiträge zur Entomofaunistik* 7: 49-62.
- Zolt J, 2001.** Somogy megye fullánkos hártýásszárnyú (Hymenoptera, Aculeata) faunája [The Aculeata fauna of Somogy county (Hymenoptera, Aculeata)], in: *Natura Somogyiensis* 1, Kaposvár.

