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The first record of *Hahnia difficilis* Harm, 1966 (Araneae, Hahniidae) in Poland

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Abstract: *Hahnia difficilis* was found in Orawa-Nowy Targ Basin (Podhale) and western Sudety Mountains, these are the first records of this spider species for Poland. Its distribution and typical habitats are discussed. Moreover, *Hahnia montana* – a species closely related to *H. difficilis* – is recorded from the Western Tatra Mountains and a few diagnostic features to distinguish these two species are given.

Key words: spiders, *Hahnia difficilis*, *H. montana*, peat bogs, mountains

INTRODUCTION

Hahnia C. L. Koch, 1841 is a large genus that comprises 102 species (Platnick 2013), 19 of them live in Europe (van Helsdingen 2013), seven have been recorded up to now in Poland (Kupryjanowicz 2008, Rozwałka & Stańska 2008). As the European species belonging to Hahniidae may be easily assigned to the generic level by consideration of a position of tracheal spiracle and eyes' size (Harm 1966, Almquist 2005, Nentwig et al. 2013), species recognition might be more problematic, especially when only males are available. The latest revision of European *Hahnia* species, with the description of a presently recorded species, has been done by Harm (1966), but there are still many problematic issues connected with systematics and distribution of this genus.

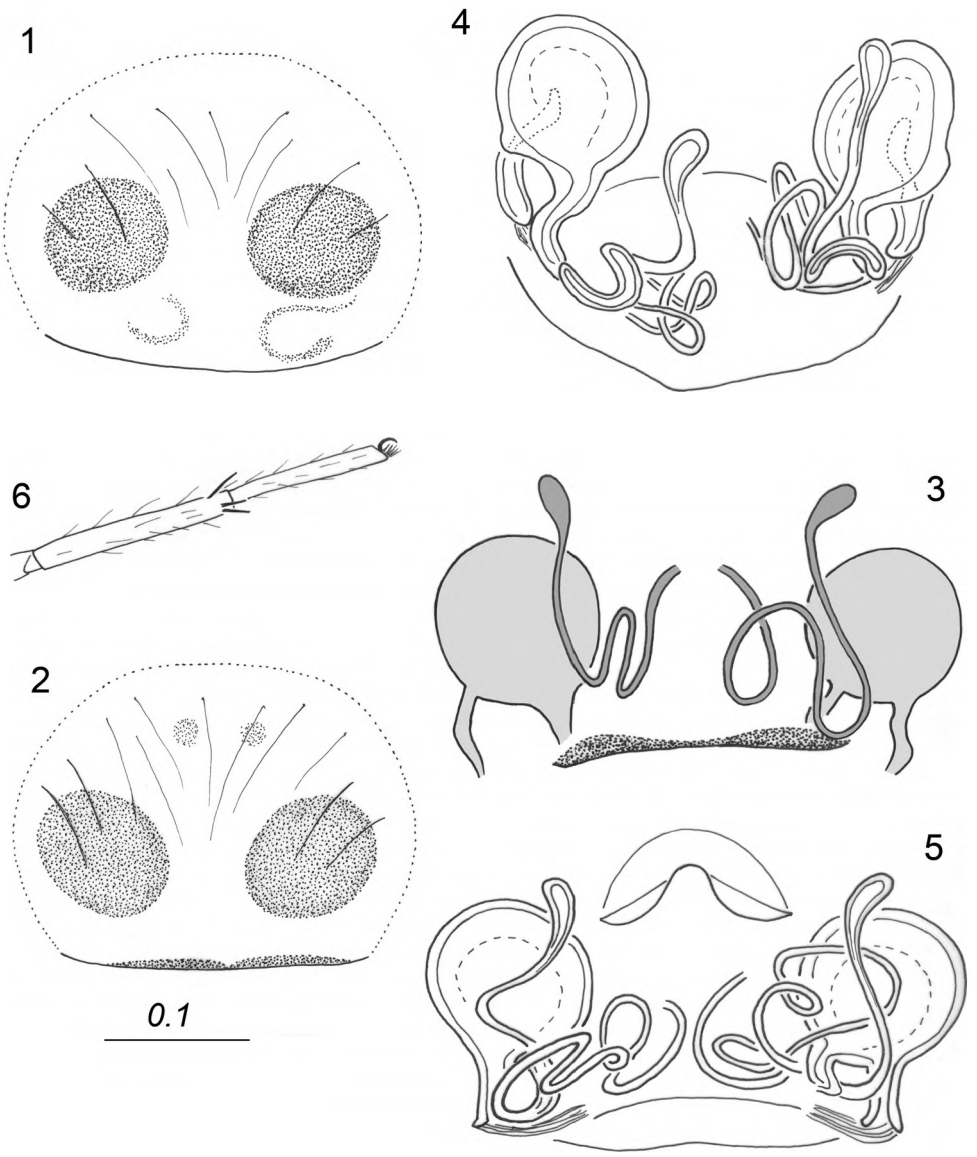
The paper presents the first record of *Hahnia difficilis* Harm, 1966 from Poland. This species was found on mountainous and sub-mountainous bogs.

SPECIES IDENTIFICATION

Female of *H. difficilis* (Fig. 15) is easily distinguished from congeners by the small, 'tentacle-shaped' secondary spermathecae. Copulatory openings are placed in the middle-anterior part of epigyne, copulatory ducts are thin, very long, primary spermathecae round and medium sized (Figs 1–6, 16).

However, recognizing males might prove to be more problematic, as they are similar to males of *Hahnia montana* (Blackwall, 1841) and – in smaller extent – to those of *Hahnia candida* Simon, 1875. Males of these species – so called *H. montana*-group, *sensu* Harm (1966) – have got roundish bulb, very thin and long embolus, hook-shaped tibial apophysis, sharp patellar apophysis that is directed posteriorly, as it may be seen by *H. difficilis* (Figs 7–9, 12–14). Recognizing males of *H. montana* (Fig. 19) and *H. difficilis* (Fig. 11) on basis of palpal structures is problematic. Harm (1966) recommends comparing femora of male palps

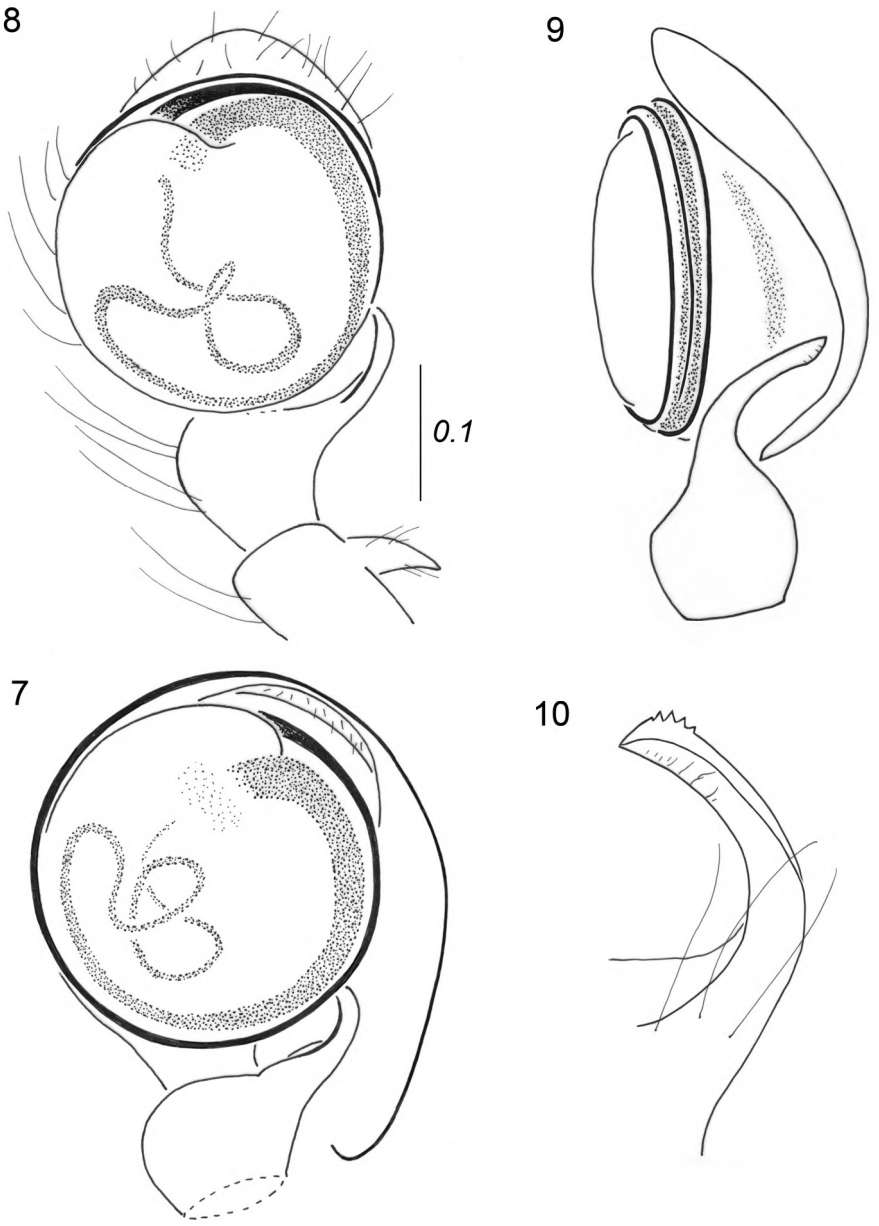
– *H. montana* has three deeply black spines on the 'outer' surface, while *H. difficilis* lacks this character. Even if these spines are broken, three large chaetopores are clearly visible.



Figs 1–6. *Hahnia difficilis*, female: 1, 2 – epigyne, 3 – epigyne, dorsal view; 4, 5 – internal structure of epigyne (two specimens); 6 – distal segments of leg IV.

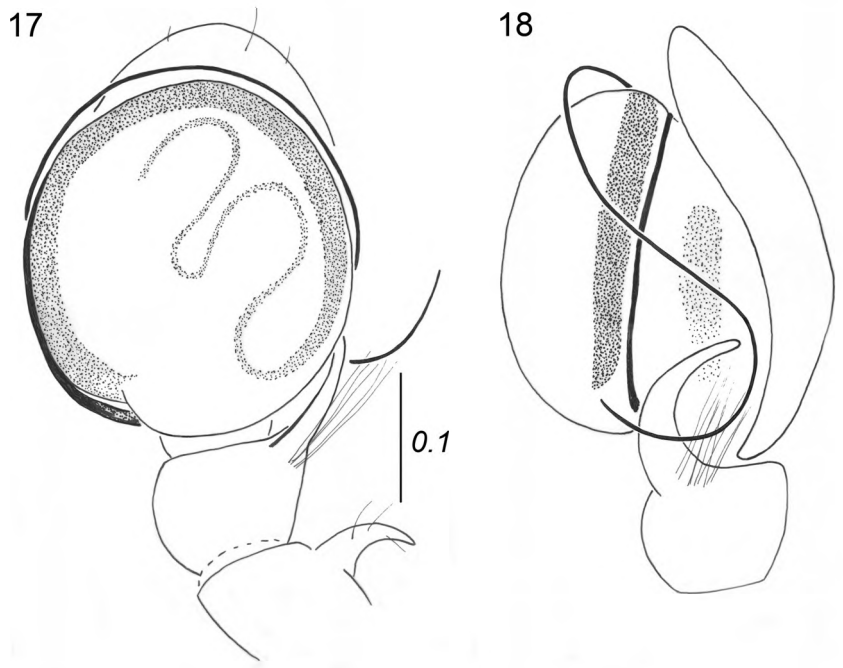
This seems to be the most reliable feature to tell apart these two species, however further differences can be listed: the bulb of *H. montana* is more convex than by *H. difficilis*; the embolus is longer in *H. difficilis* and encircles a bulb two and a half time (two times in *H. montana*); the arrangement of spermophore duct is other – in case of *H. montana* it begins in

the posterior part of a bulb and its distal part is meandering, whereas in *H. difficilis* spermophore starts at the anterior part of a bulb and its distal part forms the crossing loops (compare Figs 7–9, 12–14 with Figs 17–18, 20–22). According to Miller (1971) *H. montana* has six small teeth on the tip of tibial apophysis, while in *H. difficilis* the number of such teeth is lower (4 to 5, as in Fig. 10).



Figs 7–10. *Hahnia difficilis*, male, palpal organ: 7, 8 – ventral view (two specimens); 9 – lateral view; 10 – tibial apophysis.

Figs 11–16. *Hahnia difficilis*: 11 – male, general appearance; 12 – palpal organ, ventral view; 13 – palpal organ, lateral view; 14 – palpal organ, dorsal view; 15 – female, general appearance; 16 – epigyne.



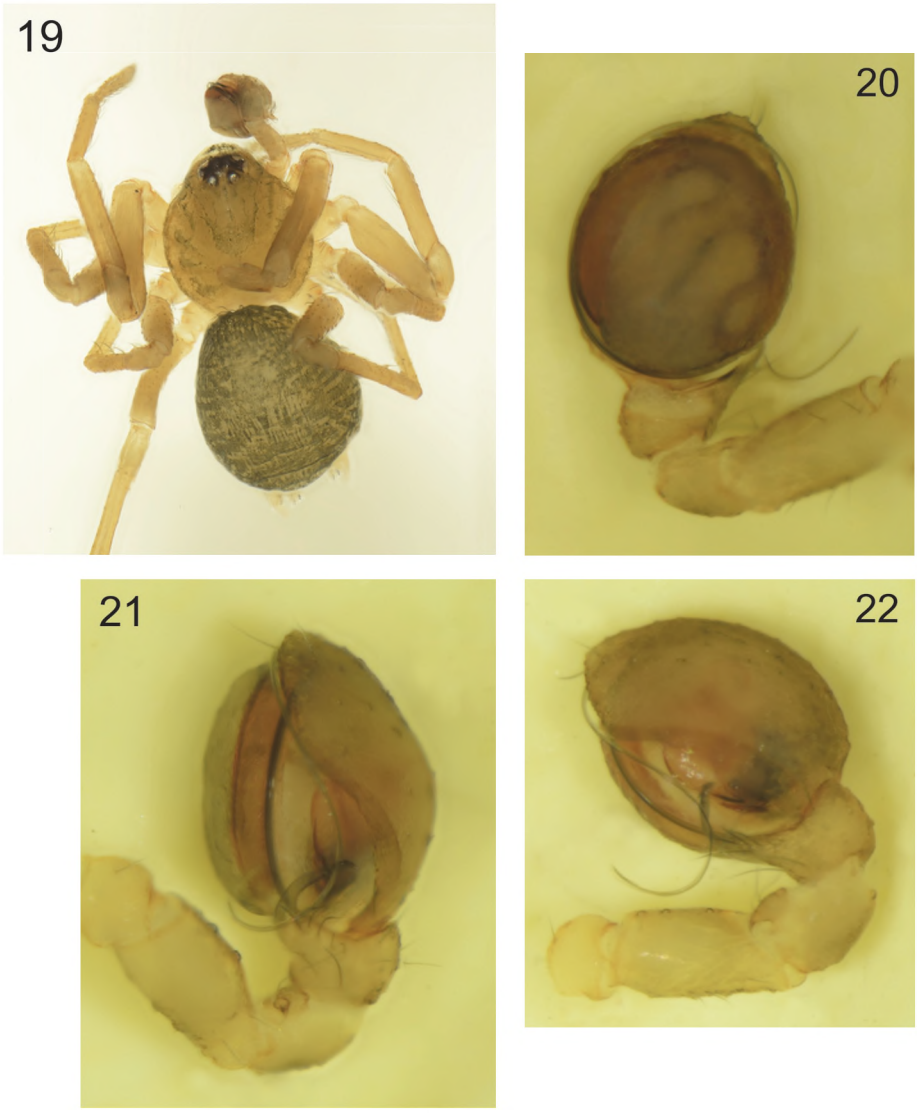
Figs 17–18. *Hahnia montana*, male, palpal organ: 17 – ventral view; 18 – lateral view.

THE RESULTS OF EXPLORATION

In total 34 specimens of *H. difficilis* were collected in southern Poland: Giant Mountains (Karkonosze), Isera Mountains (Góry Izerskie) and Orawa-Nowy Targ Basin (Kotlina Orawsko-Nowotarska). Spiders were collected by means of standard pitfall traps during the research of spiders' assemblages on different mires (Table 1).

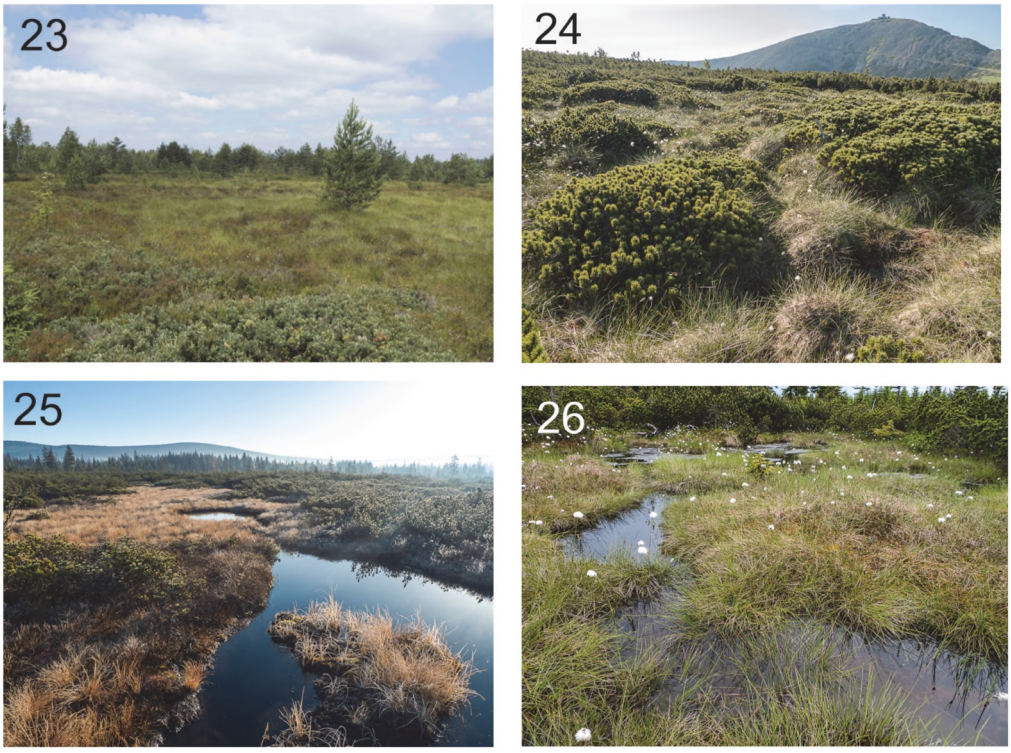
Table 1. Data on the studied material of *Hahnia difficilis*.

Region	Coordinates	UTM square	Altitude (m a.s.l.)	Exposure time of pitfall traps	N – ♂/♀
Orawa-Nowy Targ Basin (Puścizna Wielka/Piekielnik)	49°27'08" N 19°45'54" E	DV 17	657	4 Jun–28 Aug 2009 10 Sep–8 Oct 2009	5/2
Orawa-Nowy Targ Basin (Baligówka/Piekielnik)	49°27'58" N 19°48'38" E	DV 18	654	7 Jun–19 Jul 2008 29 Jul–13 Sep 2008 18 Oct–8 Nov 2008 29 Jul–13 Sep 2009	5/9
Orawa-Nowy Targ Basin (Pustać/Chyżne)	49°24'37" N 19°43'45" E	DV 07	693	14–28 Jul 2009	1/0
Karkonosze (Giant Mountains)	50°44'75" N 15°43'66" E	WS 52	1370	26 Jul–13 Aug 2010	1/0
Izera Valley	50°50'41" N 15°22'09" E	WS 23	835	4 Jul–10 Aug 2011 13 Jun–10 Aug 2012 29 Aug–23 Oct 2012	4/4
Slopes of Izera Mts	50°51'89" N 15°21'68" E	WS 23	915	2–23 Jul 2010 11–31 Aug 2010 18 Sept–18 Oct 2010	0/3



Figs 19–22. *Hahnia montana*: 19 – male, general appearance; 20 – palpal organ, ventral view; 21 – palpal organ, lateral view; 22 – palpal organ, dorsal view.

In Orawa-Nowy Targ region, *H. difficilis* was found on raised bogs, both on the apical part of their dome (Fig. 23) and near their margins, and in a pine bog forest. In Karkonosze this species was collected on a very small and highly isolated, subalpine peat bog that is partly overgrown by mountain pine (*Pinus mugo* Turra; Fig. 24). It was also trapped on a large peat bog, surrounded and overgrown by mountain pine in the Isera Valley (Fig. 25) and on a smaller one – a very similar peat bog, situated in a small saddle, within slopes of the Isera Mountains (Fig. 26).



Figs 23–26. Sampling areas: 23 – Baligówka, raised bog; 24 – Karkonosze Mountains, subalpine bog on Kopa; 25 – Isera Valley, peat bog; 26 – Isera Mountains, peat bog on a saddle among slopes of Isera Valley.

Discussion

In the other studies, *H. difficilis* was recorded in fairly similar habitats. According to Harm (1966), it was found in the litter of coniferous and deciduous forests, among moss and on the mires. In the Tatra Mountains *H. difficilis* inhabited moss of forests (Svatoň 1983). It is also considered as a characteristic species for raised bogs (Buchar & Růžička 2002).

H. difficilis has been reported from nine European countries so far: Austria, Czech Republic, France, Germany, Italy, Liechtenstein, Romania, Slovakia, Switzerland (van Helsdingen 2013), so its known range is restricted only to central Europe, but it has not been recorded in Poland up to now. *H. difficilis* seems to inhabit solely mountainous areas.

The current checklist of Polish spiders (Rozwałka & Stańska 2008) contains seven *Hahnia* species (*candida* Simon, 1875; *helveola* Simon, 1875; *montana* (Blackwall, 1841); *nava* (Blackwall, 1841); *ononidum* Simon, 1875; *picta* Kulczyński, 1897; *pusilla* C.L. Koch, 1841).

Kulczyński (1882) described *Hahnia parva* (later synonimized with *H. montana*) from the Tatra Mountains, in the vicinity of Stawy Gąsienicowe. This record is based solely on a single male. Unfortunately, the type specimen was lost and the original description is insufficient to identify the species with certainty. It is highly plausible that Kulczyński collected the closely related *H. difficilis*, because the habitats are characteristic for this species (among moss, beneath mountain pine shrubs). The other records of *H. montana* in Poland come from Śnieżnik Kłodzki (Pax 1937) – so a long time before Harm's (1966) revision and the description of *H. difficilis* – and Orlickie Mountains (Woźny et al. 1988). The latter record is

based on a single male and cannot be verified. *H. montana* has been recently collected in the Western Tatra Mountains (Niski Upłaz, nearby Czerwony Żleb, 1650 m a.s.l., 49°13'37"N, 19°53'52"E, DV 15, 1♂, 3 Aug 2013, leg. R. Rozwałka). It was found among stones on a rocky slope with mountain pine. In previous studies *H. montana* was collected in leaf litter of different forests, in moss, among stones, in grasslands (Roberts 1993, Almquist 2005), but it was also found on peat bogs (Schikora 2003, Almquist 2005) and in the mountains: Tatra Mts (Gajdoš 1993, Svatoň & Kovalčík 2006) and Karkonosze Mts (Růžička 2000). The problem of the distribution of *H. difficilis* and *H. montana* requires further research.

Hahnia candida is the other species that occurrence in Poland should be a matter of discussion. There have been four records of this species so far: in Karkonosze Mts (Dahl 1937, Pilawski 1962), Orlickie Mts. (Woźny et al. 1988) and Białowieża Forest (NE-Poland, Karpiński 1956). Despite subsequent intensive field studies in these areas (Staręga & Kupryjanowicz 2001, Rozwałka unpub., Wiśniewski unpub.) it has never been found again. The material of *H. candida* from Poland is not available, the earlier records might have been misidentifications.

Acknowledgements

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STRESZCZENIE

[Pierwsze stwierdzenie *Hahnia difficilis* Harm, 1966 (Araneae, Hahniidae) w Polsce]

Hahnia difficilis Harm, 1966 (Hahniidae, Araneae) został znaleziony w Kotlinie Orawsko-Nowotarskiej, Karkonoszach i Górach Izerskich – są to pierwsze stwierdzenia tego gatunku w Polsce. Pająki zostały schwytane w pułapki Barbera, na torfowiskach wysokich. Samice *H. difficilis* są łatwo rozpoznawalne dzięki charakterystycznej budowie narządów płciowych, samce trudno odróżnić od blisko spokrewnionego gatunku – *H. montana*. Najprawdopodobniej gatunki te były często ze sobą mylone. W artykule wyszczególniono cechy, po których można odróżnić samce *H. difficilis* i *H. montana*, podano także nowe stwierdzenie *H. montana* z polskiej części Tatr.

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