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First records of the interstitial water beetle *Hydroporus ferrugineus* Stephens, 1829 (Coleoptera: Dytiscidae) for Flanders and Brussels and new records from the Walloon region

Kevin SCHEERS

Parkstraat 21 bus 6, 9100 Sint-Niklaas, Belgium (e-mail: aquatic.adephaga@gmail.com)

Abstract

The water beetle *Hydroporus ferrugineus* Stephens, 1829 was recorded for the first time in Flanders and the Brussels region. This species was previously only known from the 'Hautes Fagnes' in the province of Liège, but there are recent records from the Brussels region and the provinces of Oost-Vlaanderen, Luxembourg and Hainaut. In this article, the recent Belgian records are summarized and the historic, recent and expected distribution in Belgium is described and discussed. Furthermore, the habitat of this species is discussed.

Keywords: Dytiscidae, *Hydroporus ferrugineus*, interstitial, subterranean, water beetle.

Samenvatting

De waterroofkever *Hydroporus ferrugineus* Stephens, 1829 is voor het eerst aangetroffen in Vlaanderen en het Brussels hoofdstedelijk gewest. Deze soort was voorlopig enkel gekend uit de 'Haute Fagnes' in de provincie Luik, maar recent werd deze gevonden in het Brussels hoofdstedelijk gewest, Oost-Vlaanderen, Luxemburg en Henegouwen. In dit artikel worden de recente Belgische waarnemingen opgesomd en de verspreiding beschreven en bediscussieerd. Verder wordt de habitat besproken.

Résumé

Le coléoptère aquatique *Hydroporus ferrugineus* Stephens, 1829 est rapporté pour la première fois de Flandres et de la Région de Bruxelles-Capitale. Cette espèce n'était connue que des Hautes Fagnes (province de Liège), mais des observations récentes ont été faites dans les provinces de Oost-Vlaanderen, du Luxembourg et du Hainaut, ainsi que dans la Région de Bruxelles-Capitale. Dans cet article, les observations belges et la distribution historique, récente et attendue, sont données et discutées. De plus, l'habitat de cette espèce a été traité.

Introduction

Hydroporus ferrugineus is a water beetle of the family Dytiscidae and, like all other European Dytiscidae, both the larva and the adult are carnivorous. The adult (Fig. 1) is 3.5-4.2 mm long, flattened, parallel-sided and has a broad head. The head and pronotum are brown-orange ('ferrugineus' means 'rusty'), the elytra are relatively pale and usually, there is a non-pigmented patterning near the base and two spots near the side on the back end, where the wings are visible through the elytra. *H. ferrugineus* is assumed to be flightless (JACKSON, 1952; 1956; 1973; KHEL & DETTNER, 2007). The larva is described by ALERIE *et al*. (2001).

H. ferrugineus is a central- and southern-European species, where it's found in al mountain-systems (BALFOUR-BROWNE, 1940; SCHAEFLEIN, 1971). In the north-east it's found in the Tatra Mountains and in the north-west in Scotland. Southwards, the distribution extends to the Pyrenees, the Alps and Bulgaria (NILSSON, 2010). BALFOUR-BROWNE (1940) mentions also Sicily as part of the distribution, but according to FRANSISCOLO (1979) these records refer to *H. memnonius* Nicolai, 1822 or

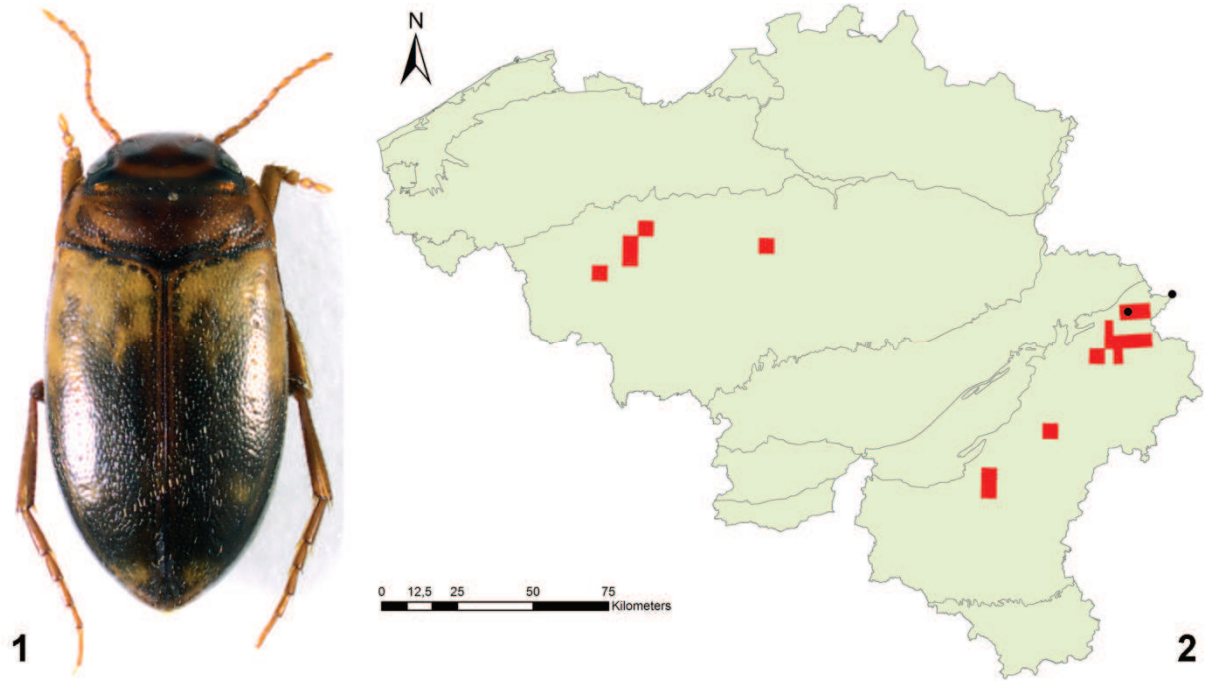

Fig. 1. Dorsal view of *Hydroporus ferrugineus* Stephens, 1829 (total length: 3.9mm, somewhat darkened specimen).
Fig. 2. Distribution of *Hydroporus ferrugineus* Stephens, 1829 in Belgium (black dots are records < 2009 and red quadrants from 2009 onwards).

H. obsoletus Aube, 1838. FRANSISCOLO (1979) gives a rough distribution map of the species in Europe that is still accurate to this date. In 2010, *H. ferrugineus* was found for the first time in The Netherlands (WATERSCHAP ROER EN OVERMAAS, 2010), when a survey on calcareous tufa was carried out.

In Belgium, the species was previously only known from the Hautes Fagnes. VAN DORSSELAER (1957) only refers to a record from the river 'La Soor' (25.IX.1935, R. d. R.) and JANSSENS (1957) mentions two specimens at Fringshaus. Only these two records are preserved and used in the work of KEIRENS (1984). DROST *et al*. (1992) mention 'Hautes Fagnes, in numbers'. Since 2008, *H. ferrugineus* was found on several new locations, not only in the Hautes Fagnes, but also far from the previously known Belgian populations (Fig. 2). Four of these new recordings were done in the Vlaamse Ardennen and one in Forêt de Soignes, these are the first records from Flanders and Brussels.

Detailed account of the recent Belgian records

Opbrakel, Molenbeek (Oost-Vlaanderen), 15.V.2008 (Leg. Mertens J.): 1 ex. in stream next to road.
Longfaye (Liège), 09.X.2009 (Leg. Scheers K.): 1 ex. in spring-fed pool.
Bihain (Luxembourg), 20.VIII.2011 (Leg. Scheers K.): 3 ex. in small ditch.
Herbofaye (Liège), 07.X.2011 (Leg. Scheers K.): 2 ex. in spring-fed *Sphagnum* bog.
Sourbrodt (Liège), 07.X.2011 (Leg. Scheers K.): 1 ex. in spring-fed *Sphagnum* bog.
Zottegem, Steenbergse Bossen (Oost-Vlaanderen), 01.II.2012 (Leg. Scheers K.): 1 ex. in trickle of water on slope in forest.
Zottegem, Steenbergse Bossen (Oost-Vlaanderen), 01.II.2012 (Leg. Scheers K.): 7 ex. in a closed concrete well/pump.
Mont, Malmedy (Liège), 13.V.2012 (Leg. Scheers K.): 7 ex. small permanent spring with *Sphagnum* moss in forest.
Fagne de Kutenhart (Liège), 30.VII.2012 (Leg. Scheers K.): 1 ex. in spring-fed *Sphagnum* bog.
Fagne de Malchamps (Liège), 27.X.2012 (Leg. Scheers K.): 3 ex. in small spring-fed ditch.
Bois d'Hubermont (Hainaut), 29.XII.2012 (Leg. Scheers K.): 6 ex. in small spring (1mm deep) with leaf litter of beech.

Brakelbos (Oost-Vlaanderen), 22.I.2013 (Leg. Scheers K.): 3 ex. in man-made spring.
Solwaster (Liège), 14.IV.2013 (Leg. Scheers K.): 1 ex. in small spring with leaf litter and some *Sphagnum*.
Tenneville (Liège), 10.V.2013 (Leg. Scheers K.): 1 ex. in spring-fed pool with *Sphagnum*.
Tenneville (Liège), 11.VII.2013 (Leg. Scheers K.): 1 ex. in pool with *Sphagnum* moss fed by a little temporary stream (see next location).
Tenneville (Liège), 11.VII.2013 (Leg. Scheers K.): 1 ex. in pool in temporary stream (which feeds the previous location).
Francorchamps (Liège), 15.IX.2013 (Leg. Scheers K.): 1 ex. in muddy spring next to a road.
Jalhay (Liège), 15.IX.2013 (Leg. Scheers K.): 2 ex. in trickle of spring water on a steep muddy slope next to the road.
Jalhay (Liège), 15.IX.2013 (Leg. Scheers K.): 1 ex. in spring-fed ditch.
Longfaye (Liège), 15.IX.2013 (Leg. Scheers K.): 1 ex. in trickle of water running over gravel at the side of a road.
Fagne de Xhoffraix (Liège), 15.IX.2013 (Leg. Scheers K.): 1 ex. in very small pool of spring water on exposed peat.
Fagne de Xhoffraix (Liège), 15.IX.2013 (Leg. Scheers K.): 2 ex. in small spring-fed pool on exposed peat with some *Sphagnum* moss on the edges.
Watermaal-Bosvoorde, Forêt de Soignes (Brussels), 14.XII.2013 (Leg. Scheers K.): 1 ex. in small spring with leaf litter of beech.

Habitat and phenology

Before 1950, all authors mention *H. ferrugineus* from cold, clear streams (ZIMMERMANN, 1931; VAN DORSSELAER, 1957) and springs (SHARP, 1882; GUIGNOT, 1947). BALFOUR-BROWNE (1940) summarizes all recordings of the species in Great Britain in detail and mentions an interesting record of the occurrence in pump water. He refers to a similar record of *H. obsoletus* "in a bath of which the water was pumped from a closed well in the basement of a house". In 1950, BALFOUR-BROWNE (1950) is the first to describe *H. ferrugineus* as subterranean. SCHAEFLEIN (1971) describes the habitat as: "In Quellen und kalten Bächen. Auch unterirdisch in Brunnen und Bergwerken. Möglicherweise subterrane Art, die nur gelegentlich ausgespült wird". FRANSISCOLO (1979) cites SCHAELFEIN (1971) and adds that the species occurs in springs at the base of rocky cliffs. Also FOSTER (2001) describes it as a subterranean species: "even in the centre of Glasgow", and mentions that it's usually found when flushed to the surface by heavy rain. FOSTER & FRIDAY (2011) call *H. ferrugineus* "truly subterranean" and mention that it's found deep in caverns in Derbyshire, but more usually at the mouths of springs after heavy rain. Furthermore, they refer to records where this species has been pumped up in well water in the Cambridgeshire fens and the centre of Glasgow (FOSTER, 2001).

All Belgian specimens were found at the mouth of springs or small spring-fed waters in forests and raised bogs. In bogs, the species occurs along with typical bog-species like *Hydroporus melanarius* Sturm, 1835 and *H. gyllenhalii* Schiodte, 1841. In springs, it's mostly the only species found. In the Steenbergse Bossen (Zottegem), the species was found in numbers in a closed concrete well, accompanied by *Agabus guttatus* (Paykull, 1798), which is very similar to the records in pumped up well water in Great Britain (BALFOUR-BROWNE, 1940; FOSTER, 2001; FOSTER & FRIDAY, 2011). The record from Bihain was from a little pool in a small ditch. One or two days before the discovery, it had rained, when the specimens of *H. ferrugineus*, accompanied by good numbers of *Agabus guttatus*, were found, there was a little pool of water left in the ditch. The next day, the pool was almost dry and both species were gone. Presumably this ditch fills after heavy rain and the specimens were flushed out there natural habitat. After a few days of heavy rain, a short inventory of the area between Hockai and Longfaye resulted in the finding of eight specimens at six locations. It seems likely that most records in streams and springs refer to specimens that are flushed out their natural habitat of interstitial water. This theory is supported by the facts that 1) in most cases only a few specimens can be found (even after a long and intensive search); 2) larvae have not yet been encountered in Belgium, although the species has been found throughout the year; 3) the species has almost never been found twice on the same location and 4) some of the locations where the species has been found are temporary streams and springs that remain dry most of the year. Which precise factors their interstitial habitat

must have in order to be suitable is difficult to ascertain.

In Belgium, *H. ferrugineus* has been recorded in all months except March and November. In Great Britain the species is recorded in all months, peaking in June and October (FOSTER & FRIDAY, 2011). The adults of this species are to be found throughout the year and because it's habitat has a constant temperature (around 10-12°C and thus doesn't freeze), this is not surprising. Most specimens were found after heavy rain or in seasons in which springs have the greatest outflow. In both cases, the chances of finding flushed-out specimens are higher than in other periods of the year. Larvae have not yet been found in Belgium.

Discussion

The recent expansion of the distribution in Belgium is probably the result of better sampling rather than the result of the expansion of the species itself. This statement is based on the facts that *H. ferrugineus* is flightless (JACKSON, 1952, 1956, 1973; KEHL & DETTNER, 2007) and that springs are poorly investigated in Belgium. There are just a few water beetle records from springs outside Hautes Fagnes and Forêt de Soignes and almost all records of water beetles in springs date from before 1950.

Because the habitat is poorly understood, it is difficult to estimate the distribution of this species. Certain is that this species is only found on loam and rock in relief rich regions. At the moment, the distribution of this species is the same as the recent researched locations of springs (except of the southernmost part of Belgium, which is recently also relatively well studied, but where the species has not been found). It's possible that the current distribution is the result of the collecting effort of Dytiscidae in springs. The range where *H. ferrugineus* can be expected in Belgium is very similar with the mean distribution of *Agabus guttatus*, a species of springs and small streams. It's very likely that the species will turn up at a lot more places when searched for. Especially on higher grounds, where the habitat is common: Plateau des Tailles, Plateau de Saint-Hubert, Plateau de Recogne, Plateau de Croix Scaille, Fagne de Malchamps, etc.

Future research of the Belgian springs and streams will result in a better understanding of the habitat of *H. ferrugineus* and some other rare water beetles that occur in our springs. In the case of *H. ferrugineus*, investigation of concrete wells (like the one at the Steenbergse Bossen) could be a relatively easy and quick method to find new locations.

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