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The unexpected discovery of *Brachyopa obscura* THOMPSON & TORP, 1982 (Diptera: Syrphidae) in Belgium

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Abstract

The syrphid species *Brachyopa obscura* (Diptera: Syrphidae) is reported for the first time from Belgium with some records dating back to 1986. This species has been found in four near localities in the Viroin basin (50 km south of Charleroi). Details of these records together with some behavioural observations are presented here. The distribution of *B. obscura* in Europe and its probable association with aspen *Populus tremula* is discussed.

Keywords: *Brachyopa*, *Populus tremula*, new Belgian species, Belgian fauna

Résumé

Le syrphide *Brachyopa obscura* (Diptera : Syrphidae) est mentionné pour la première fois de Belgique, les données les plus anciennes datant de 1986. Cette espèce a été découverte dans quatre stations situées dans le bassin du Viroin (50 km au sud de Charleroi). Des données détaillées, ainsi que des observations du comportement de l'espèce sont décrites. La distribution en Europe et l'association probable avec le peuplier tremble *Populus tremula* sont discutées.

Samenvatting

De zweefvlieg *Brachyopa obscura* (Diptera : Syrphidae) wordt voor het eerst gemeld voor België; de oudste nu bekende gegevens gaan terug tot 1986. Deze zweefvlieg werd ontdekt op vier plaatsen in de vallei van de Viroin (50km ten zuiden van Charleroi). Dit artikel geeft een gedetailleerde beschrijving van de vondsten en het geobserveerde gedrag. In de discussie wordt dieper ingegaan op de verspreiding van *B. obscura* in Europa en een vermoedelijke associatie van deze soort met ratelpopulier (*Populus tremula*).

Introduction

Representatives of *Brachyopa* are exceptional Syrphidae in both their behaviour and their habitus. They bear close resemblance to droneflies (Scatophagidae) and may not be recognized as being hoverflies (Syrphidae) by inexperienced naturalists. They belong to a specialized group of woodland Syrphidae that live as larvae in sap runs or decaying accumulations of sap under tree bark. To some extent *Brachyopa* species seem to prefer either coniferous or deciduous trees for reproduction, or may even be associated with a particular tree species. In Belgium seven species of *Brachyopa* were known to date: *B. bicolor* (Fallén, 1817), *B. insensilis* Collin, 1939, *B. panzeri* Goffe, 1945, *B. pilosa* Collin, 1939, *B. testacea* (Fallén,

1817), *B. scutellaris* Robineau-Desvoidy, 1844 and *B. vittata* Zetterstedt, 1843. A literature search of faunistic reports in areas adjacent to Belgium indicated that three more species of *Brachyopa* can be expected in Belgium: *B. dorsata* Zetterstedt, 1837, *B. grunewaldensis* KASSEBEER, 2000 and *B. silviae* Doczkal & Dziock, 2004. All three species have been recorded within a 100 km radius from Belgium (VAN DE MEUTTER F., unpubl. data).

Brachyopa obscura was only recently recognized by THOMPSON AND TORP (1982), who noted that it may only be discerned from *B. testacea* in the male genitalia. Later on, several authors pointed to some additional characteristics that may be used to discriminate both species, and now also females may be identified, e.g. by the unicolorous abdomen and the wing venation pattern (STUKE, 2001) or the rather short snout compared to *B. testacea* (see also Fig. 4). However, care has to be taken since overlap with *B. testacea* for the latter characters exists (G. Van de Weyer, pers. comm.). Identification of Northwest European *Brachyopa* cannot be achieved with VERLINDEN (1991, 1994) due to some errors in the key and because several species are lacking. Belgian *Brachyopa* species are best identified with VAN VEEN (2004) together with its published addenda.

Gradually more ecological information on *B. obscura* became available, which pointed to some clear niche differentiation from its sibling species *B. testacea*. Apparently *B. obscura* is found in (wet) deciduous woodland often near *Populus* trees (STUKE, 2001, BARTSCH, 2009), whereas *B. testacea* is a genuine conifer specialist confined to *Larix*, *Picea* (mostly) and *Pinus* (SPEIGHT, 2010). Due to its rather recent description and because of ongoing confusion with *B. testacea*, the distribution of *B. obscura* is currently not well known. It has been reported regularly, though, from Fennoscandia and the northern parts of European Russia to the east (NIELSEN, 1992, NILSSON *et al.*, 2007, SPEIGHT, 2010). These observations suggest that *B. obscura* is a northern species within Europe. Recently, however, it was discovered in Germany (KEHLMAIER C. & DOCZKAL D., pers. comm; STUKE 2001, MERKEL-WALLNER, 2005, 2010), Poland (KLASA & SOSZYNSKI, 2010) and Montenegro (VUJIC, 2001). Whereas STUKE (2001) still hypothesized that the population in northern Germany would represent the south-western range margin of *B. obscura* in concordance with several other northern organisms in this region, the observations more south in Germany and in Montenegro (VUJIC, 2001) indicate a much wider distribution of *B. obscura* throughout Europe. Still, it came as a big surprise when *B. obscura* was found in the south of Belgium.

Description of the records and some behaviours

Seven records are known to date (N: Netting; MT: Malaise trap):

BELGIUM : **Hainaut** : Virelles, Etang de Virelles réserve naturelle site C (*Alnus* carr), 1 ♀, 5-12.V.2006, MT; idem site B (*Filipendula* marshland), 1 ♀, 12-19.V.2006, MT, both leg. Sébastien Pierret, sorted by M. Pollet, det. & coll. F. Van de Meutter; Virelles, Etang de Virelles Reserve Naturelle, 3♂ + 1♀, 18-25.V.1986, MT, leg. anonymous, det. & coll. F. Van de Meutter ; idem, 3♂, 7-14.VI.1986, MT, leg. anonymous, det. & coll. F. Van de Meutter ; idem, 3♂, 14-21.VI.1986, MT, leg. anonymous, det. & coll. F. Van de Meutter. **Namur** : Olloy-sur-Viroin, Ruisseau de Nestri, 1 ♂, 15.V.2005, N, leg., det. & coll. B. Wakkie; Fond de Noye, 3 ♂, 22.V.2010, N, leg., det. & coll. F. Van de Meutter.

On May 14, 2005 F. Van de Meutter spent a full day searching for Syrphidae in the forest south of Olloy-sur-Viroin. This forest is part of a 100.000 ha historical woodland that has remained largely unchanged (in terms of size) for at least several hundred years. Nevertheless, Syrphidae records of this promising area proved extremely scarce. The survey of Van de Meutter aimed to reveal this unknown biodiversity and was very productive by yielding sightings of more than 80 syrphid species including six *Brachyopa* species, *Chalcosyrphus eunotus*, and many other species of special interest (Van de Meutter, unpubl. data). Inspired by these findings, B. Wakkie visited the same area the very next day. At a large *Picea* growing along a brook , the "Ruisseau de Nestri" (bordering a path which prolongs de Rue de Hérutis), a large number of male *B. testacea* were swarming, which attracted his attention. Only a little bit further up the brook, another similar *Brachyopa* was seen sitting on tree leaves. The smaller size and the paler colouration (as compared to the *B. testacea* specimens) made him decide to capture this fly. It turned out to be a male *B. obscura*.

From April until September 2006 M. Pollet

conducted an intensive inventory on flying insects in the Etang de Virelles Nature Reserve (Hainaut, see: http://www.aquascope.be/etang/entomo_mouches.html). This nature reserve is unique in Belgium in being an old forge pond of about 80 hectares, filling a geological depression in the landscape. Especially in the north and west, a large area with humid forests and marshlands fringes the lake. One Malaise trap was installed in four different habitats (reed marsh; *Filipendula* marshland; alder carr; willow carr). In the sorted syrphid samples F. Van de Meutter discovered two females of *B. obscura*. One female was found in the sample of May 5-12, 2006 collected in a wet *Alnus* carr, north of the lake. Another female was found in the sample of May 12-19, 2006 from the *Filipendula* marshland west of the lake, and southwest of the above alder carr. Both locations are approximately 300 meters distant.

On May 22, 2010 F. Van de Meutter surveyed a woodland brook, the "Fond de Noye" (along the continuation of the Rue des Carrières, near a series of ponds) in the southwest of Olloy-sur-Viroin in search of *B. obscura*, inspired by the first observation by B. Wakkie. The visited valley runs parallel and 2 km west of the valley where B. Wakkie had discovered *B. obscura* in 2005 (see higher). Since this species is reported from marsh woodland with *Alnus* and *Populus* (BARTSCH, 2009), special focus was on the habitats at the bottom of the valley where *Alnus glutinosa* and *Fraxinus excelsior* dominate, together with some *Populus x canadensis*. Many *Alnus* here suffer from the fungus *Phytophtora alni* and have many visible wounds scattered over the bark. As a consequence, these *Alnus* trees have developed poor crowns that allow much light to reach the forest floor. On the flanks, the wood is dominated by dry *Quercus-Carpinus* woodland, mixed with *Betula* sp., some scattered *Picea* stands and a considerable fraction of *Populus tremula*. In the valley, from 10 a.m. onwards *Brachyopa* sp. started to arrive at some sun-lit *Alnus* and *Populus* trees. Two trees in particular, one *Alnus* and one *Populus* tree, appeared to attract a particularly large number of *Brachyopa*, and between 10 a.m. and 1 p.m., F. Van de Meutter recorded *Brachyopa* sp. at and near these two trees. The three hour recording yield ultimately comprised exclusively male specimens of *Brachyopa pilosa* (n=approx. 25), *B. scutellaris* (n=13), *B. bicolor* (n=12), *B. testacea* (n=9), *B. obscura* (n=3), and *B. vittata* (n=1). One of the *B. obscura* males was collected and retained for Van de Meutter's personal collection (Figs 2, 3).

Immediately after the discovery of *B. obscura* in malaise traps at the lake of Virelles, FVdM consulted the Belgian Syrphidae database knowing that another large malaisetrap campaign (in 1986) had preceded the one of 2006 at Virelles. Unfortunately, among the hundreds of records (identified by Luc Verlinden) of that episode not a single *Brachyopa* was present. The subject was further abandoned until accidentally a communication was found to Luc Verlinden from Luc De Bruyn who was responsible for identifying some other Diptera families of the 1986 catch at Virelles. Among the material he had received, several tens of *Brachyopa* were present; likely they were not recognized as being Syrphidae at the time (which is not surprising given their atypical habitus) and sorted wrongly to other Diptera families! Interestingly, according to this letter, several *B. testacea* were among the catches, which in the light of the recent finding of *B. obscura* at this location, and the absence of *B. testacea* (and coniferous trees!) in the Virelles' marshy woodland, would require further examination! Unfortunately, the specimens were never shown to Luc Verlinden (and therefore they were never recorded in the database). Contacting Luc De Bruyn revealed the unexpected: the specimens were still preserved in his personal collection and were available for examination! Thanks to a careful preservation, these 25 years old specimens were in a perfect condition! As expected, all *B. testacea*-alike specimens belonged to *B. obscura*! A total of 10 individuals (9 males, 1 female) were found between 18 May and 21 June 1986 (for details, see higher).

The current knowledge on the distribution of *B. obscura* in Belgium is presented in Fig. 1.

Behaviour

Males *Brachyopa* sp. that were seen at the inspected trees in Olloy-sur-Viroin on 22 May 2010 displayed a strong altitudinal stratification. *Brachyopa pilosa* and *B. scutellaris* flew below 1 meter, only just above the herb layer that covers the forest floor, and regularly sat on this vegetation for some time. In the same microhabitat, also a *B. vittata* was seen, which was sitting for most of the time on herbs. At 1.5-

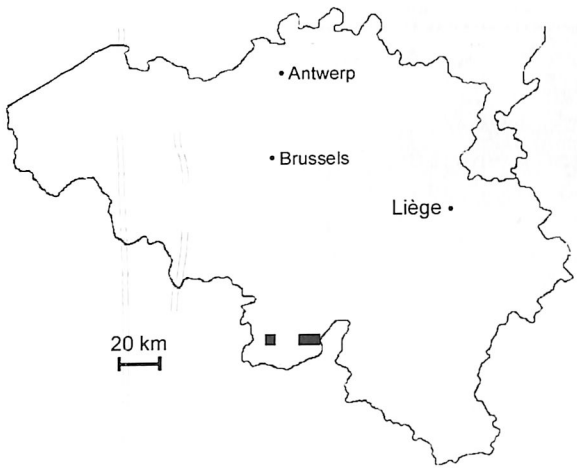

Fig. 1: Current distribution of *Brachyopa obscura* in Belgium, displayed as 5x5 UTM squares.

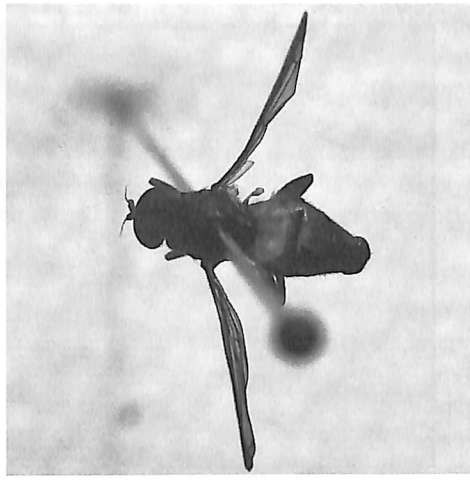

Fig. 2: *B. obscura* male, Olloy-sur-Viroin, 22.V.2010. Top view.

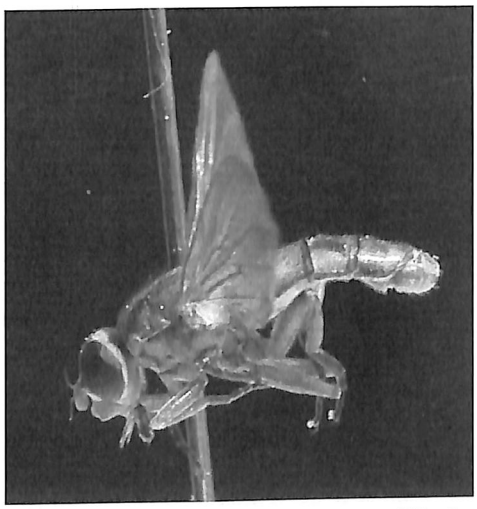

Fig. 3: *B. obscura* male, Olloy-sur-Viroin, 22.V.2010. Side view.

Fig. 4: *B. obscura* female, Virelles, 12-19.V.2006. Top view.

2.5 meters height, *B. bicolor* was the dominant species. *B. bicolor* constantly flew close to the stem, and landed occasionally on the tree trunk. Another species seen at this height was *B. testacea*. This species was also seen on the tree trunk (never on herbs) but used a more extended range from below 1 m to 2.5 m height. *Brachyopa obscura* were all observed sitting below 1 m height from the forest floor at 0.3-0.7 m distance from the stem on low herbs. Although this species bears a close resemblance to *B. testacea* in the field, it could be easily detected among other *Brachyopa* due to its small size and because similar looking *B. testacea* were never sitting on herbs.

Discussion

The discovery of *B. obscura* in Belgium was unexpected. The species was first believed to be a typical member of the northern European fauna (e.g. VAN STEENIS, 1998, STUKE, 2001, BARTSCH, 2009), yet other records indicated it may occur much more southerly, in mountainous areas at least (VUJIC, 2001). Purely latitudinal (climatic) factors may therefore not suffice to explain its distribution. An alternative explanation may be that the species is actually intimately bound to dense and old stands of *Populus tremula,* as suggested by BARTSCH (2009). The transition zone from the Calestienne to the Thiérache where *B. obscura* is found in Belgium is known for its relatively dense *P. tremula* stands which are home to a unique and rich insect fauna of *P. tremula* dependent Lepidoptera species (e.g. *Archiearis notha*, *Catocala fraxini*, *Limenitis populi*, http://www.phegea.org/). *P. tremula* may be found as far south as northern Spain, Italy and the former Yugoslavia, yet dense stands of *P.*

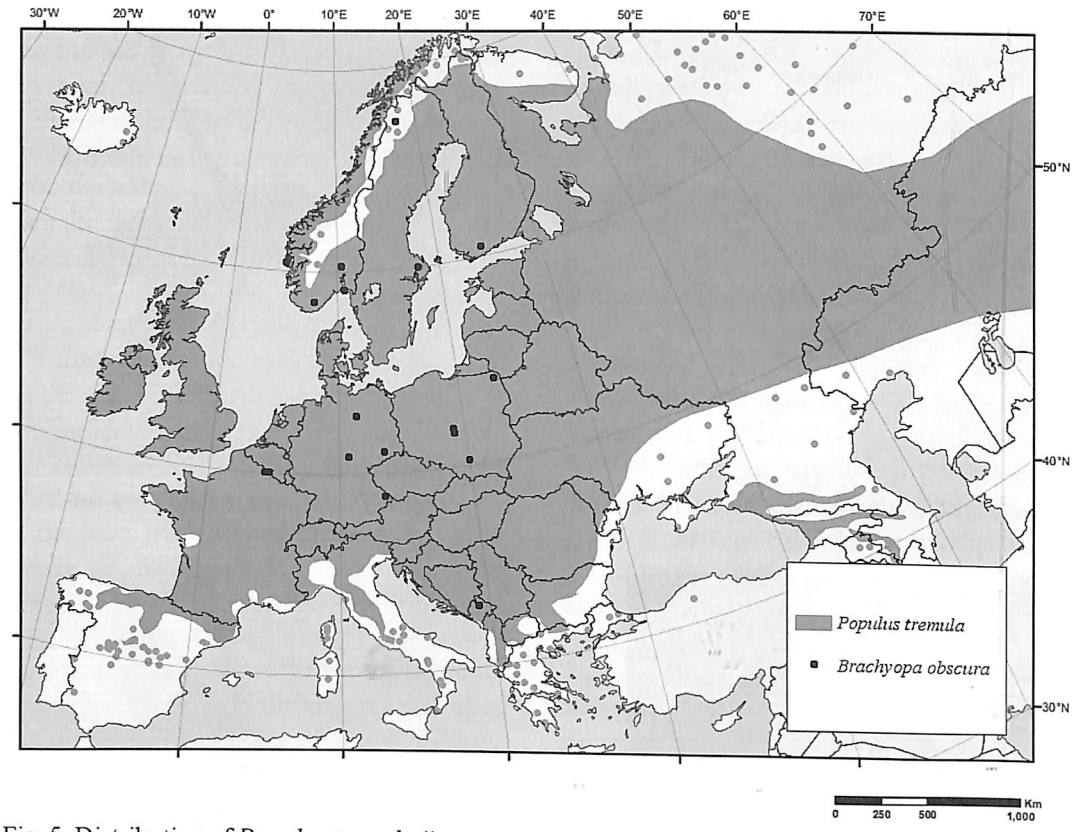

Fig. 5: Distribution of *Populus tremula* (in grey) within Europe with indication of the currently known observations of *Brachyopa obscura*.

tremula are increasingly confined to higher (thus colder) areas when going more south. In Figure 5 we have plotted the localities where *B. obscura* have been observed against the distribution of *P. tremula* in Europe. With the number of localities of observation increasing, *B. obscura* is now found over a major part of the distribution of *P. tremula* (Fig. 5, modified from EUFOGEN 2009), and it is not yet clear where its actual range limit may be.

The habitat requirements of *B. obscura* seem to overlap - to some extent - with those of the related *Hammerschmidtia ferruginea*, a flagship species of pristine *P. tremula* woods (ROTHERAY *et al.*, 2009). *Hammerschmidtia ferruginea* is believed to be a rare and threatened syrphid over much of its range (SPEIGHT, 2010) and has never been observed in areas near Belgium. One exception constitutes an intriguing isolated old record from northwestern France (SARTHOU *et al.*, 2010), close to the Belgian sites where *B. obscura* has now been found. This (sole!) French historical record was little understood thus far, however, from the current perspective that *B. obscura* occurs in this area, this record may indicate that once pristine *P. tremula* woods existed here that supported *B. obscura* as well as isolated *H. ferruginea* populations.

Our observation that *B. obscura* males may aggregate near *Alnus* and *Populus x canadensis* trees seems to contradict our earlier thesis (i.e. that *B. obscura* is closely associated with *P. tremula*). However, other *Brachyopa* that are not associated with these trees (e.g. the conifer specialists *B. testacea* and *B. vittata*) were observed here as well, which might indicate a certain degree of opportunism in the specific place where *Brachyopa* males swarm. Also, the authors and several other researchers (pers. comm.) have noted that male *Brachyopa* often but shortly visit swarming locations and then move on, as if they shortly judge habitat quality (or search for mating partners?) and leave again when they deem it unattractive. Irrespective of the reason behind the observed behaviours, they make that samplings such as ours at only one or few tree species may yield a mixture of *Brachyopa* species with different ecological requirements present in the area. In conclusion, we state that despite swarming activity by male *Brachyopa* to take place usually near the general microhabitat type where they breed (sap runs), this may differ from the actual breeding habitat (a particular tree species) where they reproduce. The above records therefore do not necessarily

invalidate the widespread idea that *B. obscura* is largely dependent on *P. tremula* or some related *Populus* species for reproduction (*P. nigra*, STUKE, 2001). Since this behaviour is probably part of a mate-finding strategy, it remains to be studied whether females are also more attracted to such places.

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