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Publication date

2009

Published in

Phegea

[Link to publication](#)

Citation for published version (APA):

Boumans, L., Zimmer, J.-Y., & Verheggen, F. (2009). First records of the 'bathroom mothmidge' *Clogmia albipunctata*, a conspicuous element of the Belgian fauna that went unnoticed (Diptera: Psychodidae). *Phegea*, 37(4), 153-160.

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First records of the 'bathroom mothmidge' *Clogmia albipunctata*, a conspicuous element of the Belgian fauna that went unnoticed (Diptera: Psychodidae)

Louis Boumans, Jean-Yves Zimmer & François Verheggen

Abstract. The 'bathroom fly' *Clogmia albipunctata* (Williston, 1893) (Diptera: Psychodidae) is a cosmopolitan species that is commonly found in bathrooms, kitchens, sewage treatment plants and compost heaps. Of circumtropical origin, the species probably spread to synanthropic habitats in northern and central Europe during the past decades. The first documented findings in Belgium are discussed, together with general information on the biology and recognition of the species.

Samenvatting. Eerste vermelding van de motmug *Clogmia albipunctata*, een opvallende, maar onopgemerkte soort van de Belgische fauna (Diptera: Psychodidae)
De motmug *Clogmia albipunctata* (Williston, 1893) (Diptera: Psychodidae) is een kosmopolitische soort die vaak wordt aangetroffen in toiletten en badkamers, en daarom in het Engels wel bekend staat als bathroom fly. De soort is ook in België waarschijnlijk algemeen. Dit artikel bespreekt de eerste gedocumenteerde Belgische vondsten en geeft algemene informatie over de verspreiding, herkenning en biologie.

Résumé. Première mention de *Clogmia albipunctata*, une espèce commune mais passée inaperçue de la faune belge (Diptera: Psychodidae)
La 'mouche de salle de bain' *Clogmia albipunctata* (Williston, 1893) est une espèce cosmopolite fréquemment rencontrée dans les salles de bain, les cuisines, les conduites d'eau usée et les tas de compost. D'origine circumtropicale, cette espèce s'est probablement étendue à des habitats synanthropiques dans le nord et le centre de l'Europe au cours des dernières décennies. La découverte de l'espèce en Belgique est examinée, et des informations générales sur la biologie et la reconnaissance de l'espèce sont données.

Keywords: *Clogmia albipunctata* – Psychodidae – moth fly – faunistics – indoor pest – first record.

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Introduction

Most people will be familiar with the small flies inhabiting the less well-maintained sanitary facilities in such places as petrol stations and camping sites, where the larvae breed in the drains.

A few cosmopolitan species of moth flies (Psychodidae), also known as drain flies or filter flies, are well adapted to this kind of habitats. When they occur in small numbers, moth flies will mostly remain unnoticed. In buildings with a malfunctioning sewage system, they can occur massively. While these non-biting moth flies of the subfamily Psychodinae do not carry any known disease, when present in abundance they can pose a hygienic problem, especially in hospitals (Verheggen *et al.* 2008). In cases of a real infestation, inhaling fine particles of the scale-like hairs that detach from living and dead insects can cause respiratory problems. Some past studies have also shown the possibility for such flies to carry bacterial germs. In November 2006, a hospital in the

Netherlands had to cancel surgical operations for two days because moth flies — of an unidentified species— were found in the operation rooms (Anonymous 2006).

In such situations the moth flies are typically 'controlled', but not identified to species level. As a result, a very common and photogenic species, *Clogmia albipunctata* (Williston, 1893), is still missing from the Belgian species list.

Taxonomy

The taxonomic history of Psychodidae is complex, having resulted in many synonyms for the same species. *Clogmia albipunctata* was first described in 1893 by Williston, under the name *Psychoda albipunctata*. This species became the type species of the genus *Clogmia* Enderlein 1937, but for a long time specialists considered *Clogmia* to be a synonym of *Telmatoscopus* Eaton 1904. Vaillant placed most *Clogmia* species, including this one, in a newly defined genus *Telmatoscopus* Vaillant 1972.

The current situation is that in much of the medical, toxicological and ecological literature the species is referred to as *Telmatoscopus albipunctatus*, whereas taxonomists typically adhere to name *Clogmia albipunctata*. The latter is the valid name according to Fauna Europaea (Wagner 2004), though the website yields *C. albipunctat-us*, with an incorrect ending for the grammatical gender. In addition, this cosmopolitan species has been described independently several times, so that a number of less commonly used synonyms exist. More taxonomic details are provided by Vaillant (1972: 52), Wagner (2004) and Ibáñez-Bernal (2008).

Distribution in Europe

Vaillant (1971: 2) defines the distribution of *C. albipunctata* as the world-wide belt between 40° southern and 42° northern latitude. However, the species currently occurs much further northward in Europe, at least in synanthropic habitats. In 1993 it was found for the first time in Germany, in a treatment facility for domestic waste close to Berlin (Werner 1997). Fauna Europaea (Wagner 2004) mentions the species as occurring in Germany, France, Spain, Italy and Slovenia, as well as the Canary Islands, Madeira and Sardinia. Ježek & Goutner (1995) list the species for Greece. We have recently published on the occurrence of *C. albipunctata* in the Netherlands (Boumans 2009). There can be no doubt that *C. albipunctata* is now common all over Europe, with the possible exception of the British Isles and Scandinavia.

Observations in Belgium

In early spring 2007, patients of the psychiatry department of CHU Brugmann, a suburban hospital in Brussels, noted the presence of "little worms" in a bathroom. A few weeks later "small flies" were seen in another care unit. These larvae and flies were sent to the Functional and Evolutionary Entomology Department of the Gembloux Agro-Bio Tech, University of Liège, where they were identified as moth flies (Verheggen *et al.* 2008). In February 2009, the first

author identified a sample of fifteen adults, including five males, as belonging to the species *C. albipunctata* (fig. 2). The identification was based on the identification key, descriptions and drawings of Vaillant (1971, 1972) and Ibáñez-Bernal (2008), as well as comparison with Dutch specimens identified by the Psychodidae specialist Prof. Rüdiger Wagner (Boumans 2009).



Figs. 1–4. *Clogmia albipunctata*. 1.– Belgium, West Flanders, Beernem, 13 September 2008. Photo Geert Vanhulle. 2.– Male genital appendages of one of the specimens of *C. albipunctata* collected at the CHU Brugmann hospital in Brussels. Photo Louis Boumans. 3.– In Gent, *Clogmia albipunctata* was found to breed in garbage containers in September 2008. The pupa belongs to a different family of Diptera, possibly Phoridae. Photo Michel Vuijlsteke. 4.– This picture of *Clogmia albipunctata* taken in Gent in August 2004 currently represents the oldest known Belgian record. Photo Michel Vuijlsteke.

In addition to these collected specimens, browsing the internet yielded several pictures of this pretty moth fly taken in Belgium. These are listed in Table 1. So far, the earliest documentation of *C. albipunctata* from Belgium dates from August 2004.

The observations of *C. albipunctata* in Belgium were all done in or around buildings. This concurs with the observations from the Netherlands, where the species was found in kitchens, toilets and bathrooms, and in a compost heap (Boumans 2009).

Table 1. Photographs of *Clogmia albipunctata* from Belgium. Localities with an asterisk are taken from the site waarnemingen.be. Missing coordinates specified to the level of minutes are estimates based on a gazetteer.

Locality	Coordinates	Date	Photographer	Details
Gent, Waterrijk	N 51°03.541' E 3°43.691'	14-08-2004	Michel Vuijlsteke	indoors
Ledegem	N 50°51' E 3°07'	14-10-2005	David Pollet	terrace
Wichelen	N 51°00' E 3°58'	3-4-2006	Steve Pichal	indoors
Gent	N 51°01.872' E 3°41.116'	16-9-2006	Michel Vuijlsteke	waste container outdoors
Achel*	N 51°16.113' E 5°28.557'	13-7-2008	C.Kuipers	indoors
Bornem*	N 51°05.732' E 4°13.884'	31-8-2008	Herwig Mees	
Beernem	N 51°07' E 3°19'	13-9-2008	Geert Vanhulle	small sewage well
Tongeren	N 50°46' E 5°28'	5-10-2008	Harry de Koning	kitchen
Sint-Niklaas*	N 51°09.063' E 4°08.550'	26-4-2009	Onafhankelyke Vogelaars	
Gent centre*	N 51°02.961' E 3°42.903'	31-5-2009	Antoon De Rycke	indoors
Wichelen	N 51°00' E 3°58'	14-7-2009	Steve Pichal	indoors
Mol*	N 51°11.423' E 5°02.460'	10-8-2009	Eric Hantson	indoors

Recognition

Psychodidae have long hairs (macrotrichia) on the wing veins, the legs and the body. In many species the wings have an attractive pattern of colours and markings. It seems likely that several species can be recognized by the wing pattern, but the required documentation for this purpose, such as reliably identified colour pictures, is largely lacking.

The trichia play almost no role in the identification keys for Psychodidae. During their short life, the adult moth flies tend to loose these, and the wing pattern fades. Moreover it is impossible to collect and prepare the animals without damaging the trichia. Collections are usually kept in ethanol, which makes the trichia detach, exposing other characters for identification, notably the genital appendages. Larvae and depilated adults of *C. albipunctata* can be identified under a binocular with the keys of Vaillant (1971, 1972), who uses the genus name *Telmatoscopus* for this species. Vaillant provides many drawings of details; besides those the additional description and drawings of Ibáñez-Bernal (2008) are helpful.

Although the identification of moth flies generally requires making microscope preparations, the habitus of *C. albipunctata* is sufficiently characteristic to recognize the species from a clear photograph. This holds particularly if the picture was taken in Europe, where there are no similar-looking species, and in its typical habitat of sewage drains, bathrooms and the like. For this purpose we provide, as an addition to the literature sources cited, a description of the habitus of *C. albipunctata*.

Clogmia albipunctata is a large moth fly of mostly grey or dark brown colour. The wings have conspicuous white spots and the ends of the longitudinal veins (Fig. 1). At about half the length of the wing there is a second row of white spots arranged in a V-shape with the angle of the V pointing distally.

At about one third of the wing length from the base, at the base of veins R2 and M2 (just beyond the forks R2-3 and M1-2), there are two tufts of trichia that look like dark or dark-and-white spots. The tufts are formed by trichia pointing towards each other: the partly white trichia on the basal side are directed distally, the dark trichia on the distal side point basally. The trichia on the basal portion of vein R2-3, before the fork, are of a reddish brown colour.

Other moth flies associated with the same type of anthropogenic habitats are *Tinearia alternata* (Say, 1824), *Psychoda cinerea* Banks, 1894, *P. albipennis* Zetterstedt, 1850 and *P. parthenogenetica* Tonnoir, 1940 (cf. Werner 1997). The latter two species are treated as synonyms in some references, but not in others. *Psychoda albipennis* is a sexual species with fifteen antennal segments, whereas *P. parthenogenetica* is a triploid parthenogenetic lineage (Milrouse 1942, Troiana 1978) with fourteen segments.

When at rest, these other species keep their wings roof-shaped, slantwise over the abdomen whereas *C. albipunctata* keeps its wings in a horizontal plane.

Clogmia albipunctata is the larger and darker species. Its wings are more rounded. The angle of the wing apex is wider than 90°, as against some 70° in *T. alternata* and *P. cinerea* and even less in the other species. The illustrations in Ibáñez-Bernal (2008) are helpful for the comparison of *C. albipunctata*, *P. cinerea* and *T. alternata*.

Biology

Clogmia albipunctata is one of the best known Psychodidae. The larvae develop in shallow, polluted water containers or wet organic material and slime, using their mandibles to shred organic material. According to Vaillant (1971), development time from egg to adult is about seventeen days, and adults live about ten days, depending on the temperature. In the laboratory at 22° C the larval stage takes sixteen to seventeen, and the pupal stage five to six days (Sehgal *et al.* 1977). Sebastiani (1978) describes the courtship and sexual behaviour: Newly emerged adults become sexually mature in about nine hours, and both sexes can mate and reproduce with more than one other individual. A female lays 200 to 300 eggs, which hatch in a few days (Sehgal *et al.* 1977, Simões *et al.* 1977, Sebastiani 1978). Thus a single pair can produce thousands of offspring in a few months.

In tropical and temperate regions, the species occurs in natural habitats in shallow pools and in rot holes in trees (Jenkins & Carpenter 1946, Paradise 2004, Harlan & Paradise 2006, Burkhart *et al.* 2007, Englund *et al.* 2007). In addition it is often found in sewage treatment plants (e.g. Heilprin *et al.* 2002, Hribar *et al.* 2004). It can be a nuisance in buildings, and especially in hospitals

(Verheggen *et al.* 2008). While not classical myasis agents, larvae occasionally breed in the body orifices of patients living under poor hygienic conditions (Nevill *et al.* 1969, Hyun *et al.* 2004, Tu *et al.* 2007).

Finally, *C. albipunctata* is appreciated as model species that is easily reared in laboratories. It is used in toxicological experiments, and in evolutionary developmental research, e.g. on embryonic segmentation processes in lower Diptera (e.g. Rohr *et al.* 1999).

Discussion

In a few months' time, Boumans (2009) collected 26 observations of *C. albipunctata* in the Netherlands, most of these by browsing internet forums and asking acquainted dipterists and nature photographers. While relatively few photographers pay attention to moth flies, about a quarter of the original Dutch and Belgian pictures published on the internet show *C. albipunctata*. (On the Dutch naturalists' website waarneming.nl, out of the 42 observations of Psychodidae which were accompanied by photos in January 2009, 11 showed this species.) Together with the six observations now documented for Belgium, this shows that the species must now be very common in both countries.

If we assume that the distribution area given by Valiant (1971) was approximately accurate in the 1970s, *C. albipunctata* must have spread into north-western Europe at some time during the past few decades. There are some indications that it reached Belgium and the Netherlands only a few years ago and became widespread in a short time. The first Belgian observation we know of is from 2004; the first Dutch one from 2005. Moreover, the Dutch observations are concentrated in the southern half of the country. On the other hand, the overall number of records of moth fly species from these countries is very small, and we owe many documented cases to the recent popularity of digital photography. There are very few experts working on non-biting Psychodidae, and the literature on this group is difficult to access. Therefore, *C. albipunctata* may well have gone unnoticed for a longer period.

Humans can easily disperse synanthropic moth flies like *Clogmia* over long distances with garbage or small water containers like car tyres. The underground sewage system may aid local dispersal. Alternatively, the species may spread on its own during the summers, when it also breeds outdoors. More observation data, including historical records, are needed to establish when the range expansion took place and what the principal mode of dispersal is in Europe. It would be interesting to know, for instance, whether it also breeds in natural habitats like tree holes in this part of the world, and whether larvae can survive the winter outdoors. A final interesting question is whether *C. albipunctata* larvae co-occur with other moth fly species in the same substrate, or perhaps tend to replace other species like *T. alternata* and *P. albipennis*.

Acknowledgements

We thank Michel Vuijlsteke, David Pollet, Harry de Koning, Steve Pichal and Geert Vanhulle for providing additional data on their observations. Michel

and Geert also kindly allowed reproducing their pictures. The website waarnemingen.be provided many additional observation records.

Request

In order to arrive at a better picture of the actual distribution of *C. albipunctata* and its competition with other moth fly species in synanthropic habitats, we welcome additional data from the Benelux: Psychodidae pictures and specimens collected from inside and round buildings, if possible with a description of the possible substrate of the larvae. These can be sent to L. Boumans; specimens are best sent in small Eppendorf vials with 75% ethanol.

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