# **RANGE EXPANSION OF THE INVASIVE MOTH MIDGE CLOGMIA ALBIPUNCTATA (WILLISTON, 1893)** IN SLOVAKIA (DIPTERA: PSYCHODIDAE)

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Abstract: Recent records of *Clogmia albipuncata* (Williston, 1893) are given from Slovakia. The species' European distribution is reviewed and discussed, and it is concluded that the species has expanded its range considerably in the last forty years. The biological factors facilitating for this, including the species' rapid life cycle and abundant opportunities for dispersal, are reviewed and discussed.

Key words: Clogmia albipunctata, Psychodidae, Psychodinae, Slovakia, invasive species.

# **INTRODUCTION**

*Clogmia albipunctata* is a very widespread species that occurs in tropical and temperate climates all over the world.

It is most commonly found in anthropogenic habitats such as bathrooms, kitchens and sewers; however in the tropics, the subtropics and in the USA it also commonly breeds in water-filled tree holes (VAILLANT 1989). A review of its biology can be found in BOUMANS et al. (2009).

The oldest European records of C. albipunctata were from Barcelona, Spain (TONNOIR 1920). Later, VAILLANT (1971) listed the species' distribution as worldwide between 40° S and 42° N. Currently, however, the species can be found much farther north than this - it has recently been recorded from Germany, Belgium and the Netherlands (WER-NER 1997; BOUMANS 2009; BOUMANS et al. 2009). WAGNER (2011) mentions the species as occurring (beside already mentioned countries) in France, Italy and Slovenia, as well as the Canary Islands, Madeira and Sardinia. JEŽEK & GOUTNER (1995) list the

species for Greece and JEŽEK et al. (2012) recorded the species from the Czech Republic and Slovakia.

In Central Europe, most previous records of C. al*bipunctata* have been reported from synanthropic habitats (kitchens and bathrooms) - see tables in BOUMANS 2009 and BOUMANS et al. 2009 - as well as from hospitals (FAULDE & SPIESBERGER 2012). JEŽEK et al. (2012) published the first evidence that this species also breeds in non-anthropogenic habitats in temperate Europe.

# **MATERIAL AND METHODS**

Although the identification of moth flies generally requires making microscope preparations, the habitus of C. albipunctata (figure 1.) is sufficiently characteristic to recognize the species from a clear photograph. This holds particularly if the picture was taken in Europe, where no similar looking species share the species' habitats (BOUMANS et al. 2009). We used all the credible evidence (collected specimens, identifiable photographs and observations) about this species from Slovakia and recorded it to

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Figure 1. Clogmia albipunctata, habitus. Photograph by František Šaržík (29. 8. 2012, Trenčín).

the map of Databank of the Slovak fauna (DFS). Geomorphological units and grid mapping codes of DFS are cited following LUČIVJANSKÁ (1989).

Specimens from Slovakia were collected in samples from water-filled tree holes near the village and also in the vicinity of private household in Diviacka Nová Ves and in intravilan of Zvolen. Adult individuals were stored in eppendorf tubes, preserved in 75 % ethanol and mounted in Canada balsam for identification; voucher are deposited in the NMPC (National Museum, Praha), Inv. No. 19880 – 19921, except for one previously published record from JEŽEK et al. (2012) which is housed in the University Museum of Bergen, Norway. Identification and nomenclature were used according to PELLERANO (1967), VAILLANT (1971–1983), IBAÑEZ–BERNAL (2008) and JEŽEK & VAN HARTEN (2009).

We also identified the species from photographs from Slovak websites (www.nahuby.sk and www. fotonet.sk). The illustrations in IBAÑEZ-BERNAL (2008), BOUMANS (2009) and BOUMANS et al. (2009) are helpful for identification of photographs.

# RESULTS

#### Clogmia albipunctata (Williston, 1893)

Records from Slovakia (see also figure 2):

**Bratislava** district, Bratislava, Letisko, Podunajská rovina plain, 7869 DFS, 10. 10. 2011, on the walls of buildings, in toilets, very abundant, B. Ivčič photograph, observation; Bratislava – Dúbravka, Malé Karpaty mountains, 7868 DFS, 9. 10. 2011, on the wall of the house, abundant, A. Barčák photograph; 18. 8. 2012, on the same wall, single adult, A. Barčák photograph.

**Trenčín** district, Trenčin, Biele Karpaty *mountains*, 7174 DFS, 15. 3. 2010, in the corridor of the building, single adult, F. Šaržík photograph; 28. 7. 2012, Sports hall Dukla and the vicinity of hall, very abundant, F. Šaržík photograph, observation; 4. 9. 2012, in prefab on 7 floors, single adult, F. Šaržík photograph.

**Nitra** district, Nitra, Diely, Nitrianska pahorkatina hills, 7774 DFS, 24. 5. 2012, in the building, single adult, S. Husár photograph.

**Trnava** district, Trnava, Prednádražie, Trnavská pahorkatina hills, 7671 DFS, 22. 9. 2005, bathroom



**Figure 2.** Map showing records of *Clogmia albipunctata* from Slovakia. black squares – collected specimens, gray squares – identifiable photographs and observations

in the house, abundant, the following years confirmed the occurrence, M. Cvan photograph, observation.

**Dunajská Streda** district, Šamorín, Podunajská rovina *plain*, 7969 DFS, 30. 8. 2012, on the wall of the amphitheatre, abundant, A. Barčák observation; 11. 9. 2012, on the wall of the apartment building, abundant, Š. Bruczlík photograph; 12. 9. 2012, in family home, single adult, R. Sebők photograph.

**Prievidza** district, Vrbany env. Diviacka Nová Ves, Rudnianska kotlina valley, 7276 DFS, 21. 10. 2011, oak tree hole, 1M, J. Oboňa leg., G. Kwifte det.; 29. 9. 2012 the same oak tree hole, 1F, J. Oboňa leg., J. Ježek det.; Diviacka Nová Ves, 15. 9. 2012, on the wall of family house in the vicinity of cesspool, 1F, 4M, J. Oboňa leg., J. Ježek det.

**Zvolen** district, Zvolen, Zvolenská kotlina valley, 7480 DFS, 15. 5. 2012, in the shower of apartment building, 2F, M. Očadlík leg., J. Ježek det.; 30. 5. 2012, on the window of the Technical University, 1F, J. Oboňa leg., J. Ježek det.; 26. 7. 2012, in bus station, on the window and on the walls of the Technical University, very abundant, 2F, J. Oboňa leg., observation, J. Ježek det.; 7. 8. 2012, in bus station, very abundant, 6F, J. Oboňa leg., observation, J. Ježek det.; on the window of the Technical University, very abundant, 19F, 7M, J. Oboňa leg., observation, J. Ježek det.; 2. 9. 2012, in bus station, very abundant, D. Tomášiková photograph, 27. 9. 2012, on the walls of the Technical University, 1F, M. Očadlík leg., J. Ježek det.; 2. 10. 2012, on toilet in Zvolen museum, 1F, M. Očadlík leg., J. Ježek det.; 17. 10. 2012 bus station, abundant, 1M, 3F, J. Oboňa leg., observation, J. Ježek det.

**Piešťany** district, Piešťany, Trnavská pahorkatina hills, 7472 DFS, 24. 8. – 14. 10. 2012, on the walls of family house, very abundant, Ľ. Balážiová observation, Ľ. Balážiová & J. Komár photograph; 28. 7. 2012, in many buildings, on toilet, J. Komár observation; 30. 8. 2012, Trebatice, Trnavská pahorkatina hills, 7472 DFS, in family home in toilet, single adult, Ľ. Balážiová observation.

**Pezinok** district, Pezinok, Trnavská pahorkatina hills, 7769 DFS, 2. 9. 2012, on the door of the house, single adult, A. Alena observation.

**Košice** district, Košice, Košická kotlina basin, 7293 DFS, 2. 9. 2012, in and on many buildings, abundant, K. Ox photograph, observation; 11. 9. 2012, in the shower of Home for Youth on Werferova street, single adult, F. Šaržík observation; 12. 9. 2012, Košice – Barca, on the walls of the buildings, abundant, K. Ox observation; 13. 9. 2012, in the Home for Youth on Werferova street, single adult, F. Šaržík photograph; 4. 10. 2012, in buildings, abundant, K. Ox photograph, observation.

#### DISCUSSION

*Clogmia albipunctata* (Williston, 1893) is a species that has expanded its range substantially in the later years. VAILLANT (1971) listed the species' distribution as worldwide between 40° S and 42° N. Its distribution is probably also affected by altitude. The first German record (Schwanebeck) was from 108 m a. s. l. and the Belgian and Dutch records are from even lower altitudes. It is not known how the species occurs along altitudinal gradients in the tropics.

Clogmia albipunctata is conspicuous and abundant wherever it occurs. Since previous works on synanthropic Psychodidae in the Czech Republic and Slovakia don't mention the species (e.g. JEŽEK 1972), we suppose that this species is genuinely newly arrived species in the Czech and Slovak faunas.

JEŽEK et al. (2012) recorded *C. albipunctata* in *Quercus* tree hole in autumn 2011, as the first Central European breeding record of the species from non-anthropogenic habitat. In autumn 2012 the species occurred again in the same tree hole. Its absence in earlier parts of the year predict, however, that *C. albipunctata* does not survive the winter months in this ecosystem. We assume that this tree hole was recolonized through summer with specimens from anthropogenic environments nearby. Therefore, the seasonal occurrence of this invasive immigrant in tree holes does not pose a significant risk to the native tree-hole biodiversity.

Except for the above-mentioned specimens, most observations and specimens of *C. albipunctata* from Slovakia are from large towns (e.g. Bratislava, Trnava, Nitra, Trenčín, Zvolen, Košice), from the period May to November. These localities are all in southern Slovakia, with an altitude lower than 300 m a. s. l.. The species has not yet been confirmed from north Slovakia. All published records from the Czech Republic are from anthropogenic habitats in Brno, which lies similarly in the southern part of the country at 49° 12' N 16° 37' E.

*Clogmia albipunctata* is one of the best known species from family 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), the development time from egg to adult takes about seventeen days, and depending on temperature the adults live for about ten days. In the laboratory at 22°C, the larval stage takes sixteen to seventeen days and the pupal stage five to six days (SEHGAL et al. 1977).

Humans can easily disperse *C. albipunctata* over long distances with garbage or small water containers like car tires. The underground sewage system may aid local dispersal. Alternatively, the species may spread on its own during the summers, when it also breeds outdoors (BOUMANS et al. 2009). It is not known how *C. albipunctata* spread to Slovakia, but it was probably from the Czech Republic.

The most important dispersal factor of the species is probably humans and their activity, especially transport. The presence of large quantities of individuals at transport terminals such as the bus terminal in Zvolen, suggests that specimens are dispersed to new areas with buses. To establish new populations all that is necessary is suitable breeding media (i.e. wet organic material) and a fertilized female. Each female can lay from 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.

The combination of a relatively short life cycle, high fertility and the abundance of suitable places for larvae to develop suggest that *C. albipunctata* will continue to spread rapidly. It is very likely that the species already is present, but overlooked, in neighbouring countries such as Austria and Hungary as well.

We recommend that future faunistic and ecological studies are conducted to determine:

- whether *C. albipunctata* poses a risk to other moth flies associated with the same type of anthropogenic habitats (e.g. *Psychoda (Tinearia) alternata* Say, 1824; *Psychoda (Psychodocha) cinerea* Banks, 1894; *Psychoda (Logima) albipennis* Zetterstedt, 1850)

- whether altitude may be an important limiting factor to the spread of *C. albipunctata*.

# REQUEST

### Dear readers,

In the event that you ever observed C. albipunctata at any place in Slovakia or in neighbouring countries, please capture few individuals in small container, pour with ethanol (e.g. with Alpa) and send this specimen to the address of the first author.

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