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The Most Northern Record of the Alien Composite Thrips *Microcephalothrips abdominalis* in Europe – Short Communication

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Abstract

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The most northern record of *Microcephalothrips abdominalis* (Crawford, 1910) (Thysanoptera, Thripidae) in Europe and the first record in Slovakia was described. The climate change induced introduction in synergy with biological commodity trade globalisation may support the ability of exotic elements to establish adequate populations with suitable fitness. The main threat consists in at least temporary survival in mild climate ecosystems dispersing from artificially heated interiors with the potential to transmit economically important viruses, such as *Tobacco streak virus*.

Keywords: introduction; pest; TSV

The Earth's climate has generally warmed up by approximately 0.6°C over the past 100 years (Walther *et al.* 2002) and this phenomenon has undisputedly affected the distribution and ecological dynamics of many species (e.g. Bale *et al.* 2002; Walther *et al.* 2002; Samways 2005; Deka *et al.* 2011). Climate change induced consequences in exotic pest introductions or even invasions (Lodge *et al.* 2006) often in synergy with biological commodity trade globalisation (Hulme 2009) have recently become one of the main challenges for applied phytosanitary care. In fact, up to 12.5 billion EUR have been spent annually on biological invasion control in the European Union for over 20 years (Kettunen *et al.* 2008). Aridisation and global warming patterns may induce crop vulnerability to pest infestations, projected to expand to higher latitudes (Rosenzweig *et al.* 2001) and a lot of cold-limited species may thus be able to increase their geographic range (Thomson *et al.* 2010), with numerous examples within mild and boreal climate territories (e.g. Cannon 1998; Battisti *et al.* 2005; Netherer & Scopf 2010). Changes in temperature regimes undisputedly involve alterations in development rates, voltinism, and survival of species, and subsequently act upon size, density, and genetic composition of populations (natural selection), as well as on the extent of host plant exploitation (Bale *et al.* 2002; Bergant et al. 2005; Netherer & Scopf 2010; Masarovič *et al.* 2014).

Amongst a wide variety of insects, many thrips species (Thysanoptera) have been secondarily distributed actively as well as by passive transport throughout the world (Mound 1983) in accordance with their

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relatively small size which enables them to inhabit various microhabitats (Fedor 2003, 2004; Fedor *et al.* 2010). The cohort of almost 600 thrips species including pests with the invasive and economic potential known from Europe (Vierbergen & de Jong 2013) refers to numerous examples of elements originally with tropical and subtropical distribution (Jenser & Czenz 1988; Pelikán 1989, 1991; Lewis 1997; Collins 1998; Vierbergen *et al.* 2006; Fedor & Varga 2007; Varga & Fedor 2008; Masarovič *et al.* 2017) with an ability to establish adequate populations with suitable fitness (Masarovič *et al.* 2014).

Geographic distribution of *Microcephalothrips abdominalis* (Crawford 1910) has been generally reviewed by Pizzol *et al.* (2012) as secondarily quite cosmopolitan, mainly tropical and subtropical, including Australia (Greber *et al.* 1991), Brazil (Cavalleri *et al.* 2006), Canada (Chiasson 1986), China (Vierbergen *et al.* 2006), India (Raizada 1968), Japan (Nakao 1999), Oceania (Mound & Walker 1982), South Africa (Zur Strassen 2006) or USA (Cook *et al.* 2003; Hoddle *et al.* 2004; Diffie *et al.* 2008), in fact originally described from Central America (Crawford 1910). In Europe the records predominantly refer to warmer regions in Atlantic and Mediterranean countries, including Canary Islands (Zur Strassen 2003), Croatia (Vierbergen *et al.* 2006), southern France (Pizzol *et al.* 2012), Italy (Strapazzon 1999) and Slovenia (Trdan 2002) up to Hungary (Vierbergen *et al.* 2006) (Figure 1).

Due to a significant threat of any alien pest species introduction, each faunistic record appears important for effective control and monitoring to reduce potential risks in agriculture (Fedor *et al.* 2009, 2014)

MATERIAL AND METHODS

The thrips were recorded within a complex research on Thysanoptera diversity and their invasive potential in the Bratislava region (Slovakia), with a special emphasis on the locality Kollársky vrch mining site (SW Slovakia) with 100% coverage of E1 herbaceous layer with *Calamagrostis epigeios* (L.) Roth, *Calamagrostis villosa* (Chaix) J.F. Gmel, *Solidago giganteum* Ait., *Tanacetum vulgare* L., and *Medicago sativa* L. (Majzlan 2014). The specimen of *Microcephalothrips abdominalis* was sampled by sweeping vegetation. AGA solution (84% of ethyl alcohol, 8.3% of glycerol, 8.3% of acetic acid) was used as a conservation liquid. Thrips were slide-mounted according to the standard preparatory techniques used for thrips (Sierka & Fedor 2004). The material has been deposited in the collections of the authors.

RESULTS AND DISCUSSION

Material examined. The first record in Slovakia and the most northern record in Europe: SW Slovakia,

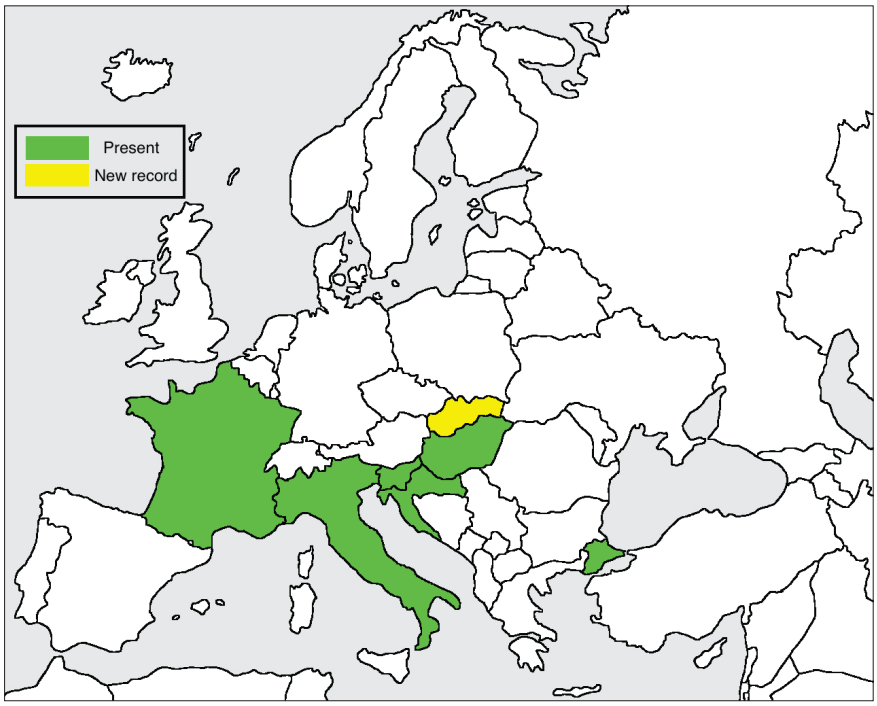

Figure 1. Distribution of *Microcephalothrips abdominalis* in Europe in 2017

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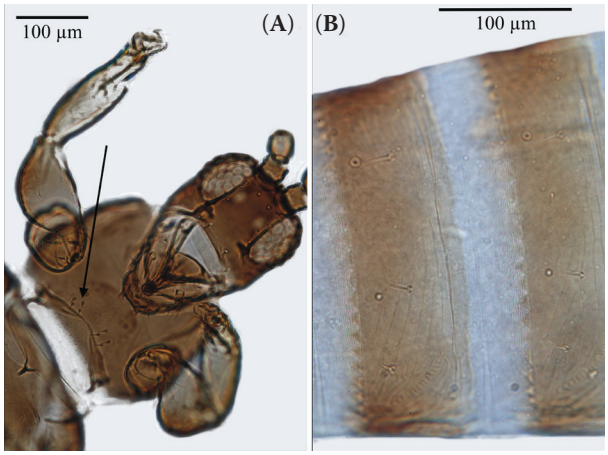

Figure 2. (**A**) Basantra with 8 setae indicated by arrow; (**B**) Tergites V and VI with the teeth forming craspeda on the posterior edge of tergites (Photo: Sigmund)

Kollársky vrch – closed gold-antimony ore dump near the city of Pezinok (48°19'10''N, 17°13'40''E), 3.8.2016, 1♀ swept, leg. J. Sigmund, det. M. Zvaríková and J. Sigmund.

Microcephalothrips abdominalis is well distinguished by the brown to dark brown body colour with pale antennal segment III and sometimes also with pale antennal segment IV, tarsi and fore tibia. The head characterised by the presence of only one anteocellar seta (S2) and central segments of antennae short as well as compact. The posterior margin of pronotum with 5–6 pairs of marginal setae. Basantra located before ferna sclerites and with 8–16 setae (Figure 2A). Mesothorax is characterised by the presence of spinula. Forewings are mostly brown coloured and bear two distal setae. The posterior margin of tergites characterised by triangular plates (Figure 2B). The posterior margin of the second sternite bear four marginal setae. Body length ranges from 1080 to 1320 microns (females) (Zur Strassen 2003).

With no doubt the precise role of climate change and biological commodity trade globalisation in worldwide distribution as well as infiltration mechanisms of *Microcephalothrips abdominalis* will remain rather disputable. However, the mutual synergic effect of these global phenomena on introduction, successful dispersal or even still sufficient population fitness is generally significant for many similar exotic species with originally circumtropical or subtropical distribution, such as *Hercinothrips femoralis* (O.M. Reuter, 1891) (Masarovič *et al.* 2014). The main threat consists in at least temporary survival in mild climate ecosystems when dispersing from artificially heated interiors (e.g. Chiasson 1986; pers. com. by prof. Heming 2016), especially glasshouses, with an ability to transmit economically important viruses (Trdan 2002) such as *Tobacco streak virus* (TSV) from *Ageratum houstonianum* Mill. (Asteraceae) to tobacco or cucumber during feeding (Greber *et al.* 1991) across open farmland.

Microcephalothrips abdominalis has been documented on a wide range of host plants, mostly ornamental ones from the family Asteraceae (e.g. *Bidens*, *Chrysanthemum*, *Helianthus*, *Pyrethrum*, *Tagetes*, *Zinnia)* (Oetting *et al.* 1993; Pizzol *et al*. 2012). Moreover, composite thrips have been reported feeding on rice (Choi *et al.* 1991), orchids (Kajita *et al.* 1992), roses (Hua *et al.* 1997), citrus trees, pepper (Frantz *et al*. 1995; Childers & Nakahara 2006) etc. Adults and juveniles are known mainly from flowers with infrequent occurrence on leaves (Oetting *et al.* 1993). The species has been observed attacking petals, corolla, stamens and developing seeds of plants, to which its heavy infestations may cause significant damage (Palmer *et al.* 1989; EPPO 1998). Petals are slightly discoloured, lose pigmentation, mature earlier and flowers may fall prematurely (EPPO 1998).

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