



The northernmost record of the Asian hornet *Vespa velutina nigrithorax* (Hymenoptera, Vespidae)

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Abstract

For the first time the Asian hornet *Vespa velutina* has been found in Hamburg (Northern Germany). So far this is the northernmost occurrence of this originally SE-Asian species in Europe and in the world. It remains unclear whether this is a single accidentally translocated specimen or one of a population already reproducing. The find may suggest that the species will possibly spread much faster than previously anticipated and modelled.

Key Words

Hamburg, honeybees, invasion biology, neozoa, insect, pest organism, yellow legged hornet.

Introduction

Invasive species represent one of the big challenges in a globalized world as they more easily reach new habitats, may change local diversity patterns and often pose threats to native species and economy (Kenis et al. 2009, Simberloff et al. 2013, Bellard et al. 2016, Bradshaw et al. 2016). Despite rising attention to the problem, the number of invasives is constantly rising (Hulme 2009, Seebens et al. 2017). As such invasive species can be considered novel important ecological and evolutionary drivers (Didham et al. 2005).

One species originating in tropical South-East Asia (native range: north eastern India, southern, south western and central China, Hong Kong, Taiwan, Burma, Thailand, Laos, Vietnam, Peninsular Malaysia, Sumatra, Java, Lesser Sunda Islands, and Timor; Archer 1994, Villemant et al. 2011, see Rome et al. 2011 for a map), which has recently invaded parts of Europe and causes problems for apiculture, is the Asian hornet, *Vespa velutina nigrithorax* Lepeletier, 1836. The first European specimens were captured in southwestern France in 2005

(Haxaire et al. 2006, Rortais et al. 2010). After initiating a monitoring campaign in 2006, the origin of the invasion was confirmed; a nest of the species was transported with pottery from eastern China (Villemant et al. 2006, Arca et al. 2015). Since then the species has quickly spread throughout much of France (Rortais et al. 2010, Monceau et al. 2014), but also parts of Spain (López et al. 2011), Portugal (Grosso-Silva and Maia 2012), Belgium (Bruneau 2011), Italy (Demichelis et al. 2012, Bertolino et al. 2016), the Netherlands (Smit et al. 2018, Slikboer and Zeegers 2019), Great Britain (Budge et al. 2017) and south western parts of Germany (Witt 2015, Verhaagh et al. 2018; newest and most northern record in Germany from Hessen in 2019, hessenschau.de) (see Rome and Villemant 2019 for an updated map). The species has been shown to be a fast invader spreading with an invasion speed of around 78 km/year in France (Robinet et al. 2017), but higher distances may be covered with means of anthropogenic accidental transportation (Robinet et al. 2018). In Hamburg a single specimen was collected alive in early September 2019 representing the northernmost find of the species so far.

Materials and methods

A female worker of *Vespa velutina nigrithorax* (Fig. 1) was collected alive on the 3rd of September 2019 in a hall of Neumann & Müller GmbH & Co. KG, Berzeliusstr. 19, 22113 Hamburg (Billbrook) (53.535855, 10.088256). The company is not involved in import or export and no goods were delivered at that time from areas where the species is known. The specimen was killed using ethyl acetate, mounted and photographed with a custom made DUN Inc. stacking system. The specimen was determined using the key by Archer (1994) and was added to the collection of the Zoological Museum Hamburg (ZMH-77474).

Results and discussion

So far *Vespa velutina* has only been found in the Southern areas of Germany (Rheinland-Pfalz, Baden-Württemberg, Hessen; Witt 2015, hessenschau.de, 21.10.19). The new record from Hamburg represents the northernmost point where the species has been found. Whether the species has already settled or whether the record represents a single introduction has to be determined in the future by monitoring the area, where the specimen was captured. However, considering the fast invasion speed of the species and its relatively high climatic tolerance it

does not seem unlikely that the species reached Hamburg on natural routes and reproduces here (Ibáñez-Justicia and Loomans 2011). Yet, other models suggest that the Hamburg area is not suitable for the species today (Barbet-Massin et al. 2013, 2018; Villemant et al. 2011). As a harbor city with much import and export Hamburg remains a hub for invasive species, which was documented by the frequent occurrence of non-native taxa in the past (e.g. for plants – Schmidt 2014, or the Asian long-horned beetle *Anoplophora glabripennis*).

Nevertheless, if the current find represents a case of natural range expansion, the species invades new areas quicker than expected even in climatically less favorable regions. Yet, areas like the Netherlands have been modelled to be suitable climatically for the species (Ibáñez-Justicia and Loomans 2011) and a fast spread over Great Britain has been predicted (Keeling et al. 2017); hence, the occurrence in Hamburg may not be entirely surprising. Due to its potential harm on apiculture (Rome et al. 2011, Monceau et al. 2014, Requier et al. 2019), the species is considered an invasive species with strong impact (European Union 2016). Therefore, the current find needs to be taken seriously, no matter if it is only a single specimen or a member of an established population. The area should be monitored in the future to destroy any potential nests to slow the speed of invasion for the species (Rome and Villemant 2017, Lioy et al. 2019).



Figure 1. The specimen of *Vespa velutina* collected in Hamburg **A** dorsal view **B** lateral view **C** frontal view.

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