



## Short communication

## Medical consequences of the Asian black hornet (*Vespa velutina*) invasion in Southwestern France

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## ABSTRACT

The presence of the Asian black hornet *Vespa velutina* in Southwestern France has been confirmed since 2005. The medical literature indicates that in comparison with other Asian hornets' species *V. velutina* is not a major health threat in Asia. A review of data from French Poison Control Centers showed only one envenomation clearly linked to *V. velutina*. The victim developed severe symptoms with neuralgia sequels after being stung 12 times on the head. This case demonstrates that like native French hornet species *V. velutina* can be dangerous for man after multiple stings. The experience of Poison Control Centers in France shows that the increase of this Asian hornet population in the southwestern regions has not been correlated with an increase in the number of hymenoptera stings.

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### 1. Introduction

Introduction of *Vespa velutina nigrithorax* into the Southwestern France was discovered in 2005 (Haxaire et al., 2006). Beekeepers have become alarmed because *V. velutina* specializes in predating honeybee foragers returning to their nests. Because of its large size *V. velutina* is a particularly intimidating and the French media quickly understood the sensational potential by comparing the introduction of this new stinging insect to the killer-bee problem in America.

### 2. History of *V. velutina* in southwest France

Introduction of the Asian hornet *V. velutina* into France was confirmed in November 2005 when the National Museum of Natural History in Paris formally identified

several specimens from a colony discovered by an inhabitant of the Lot-et-Garonne department (Villemant et al., 2006a,b). The origin of the populations in France is undetermined. A survey of entomologists indicates that hibernating founding females may have been introduced in ceramic pottery imported from China. *V. velutina* is naturally acclimated to tropical habitats (Indonesia) but it is also present in continental Asia up to northern India and mountain regions in China where the climate is similar to that of southern France. This adaptability may account for the ease with which the species was able to invade mainland France. Due to their different color, confusion of the native (*Vespa crabro*) and invading species is not possible (complete description in the French National Coordination for Toxicovigilance Internet site: [http://www.centres-antipoison.net/CCTV/Rapport\\_CCTV\\_Vespa\\_velutina\\_2009.pdf](http://www.centres-antipoison.net/CCTV/Rapport_CCTV_Vespa_velutina_2009.pdf)).

Despite the risk of honeybee predating, entomologists specialized in hymenoptera emphasized that the behavior of *V. velutina nigrithorax* toward humans is similar with that

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of the native species. Available reports indicate that they do not exhibit aggressivity to man with a nest defense perimeter of about 5 m, i.e., exactly the same as *V. crabro*. In this regard it is also noteworthy that reports from the Aquitaine region show that nests are often built in treetops, reducing the risk of contact with humans (Villemant et al., 2006a,b).

### 3. Data from the literature

*V. velutina* has not been extensively studied in its native environment and no references could be found on its venom. In Indonesia *V. velutina* is apparently considered as an aggressive species. This reputation is linked to the fact that nests are frequently built in villages thus greatly enhancing the possibility of attack. Literature describing *V. velutina* envenomation is sparse. In 1997, a report from Thailand describing a case in which two children developed multivisceral lesions with kidney insufficiency after multiple wasp or hornet stings. The offending species was not clearly identified but *V. velutina* is one of the possibilities in both cases (Vachvanichsanong et al., 1997).

At the North American Congress of Clinical Toxicology (NACCT) in 2008, a Vietnamese group presented a series of severe cases of hymenoptera envenomation. Study included all patients hospitalized for hymenoptera stings in the clinical toxicology department in Hanoi in 2002. Of the 38 cases of severe envenomation described, local hornet species including *V. velutina* were responsible for 55%. The authors reported 13 cases of renal insufficiency related to hornet stings. One of the 38 patients died due to vasoplegic (not anaphylactic) shock after multiple stings by an unspecified hornet species despite resuscitation measures. The authors concluded that hornets are the most dangerous hymenoptera species in Vietnam where attacks are common (Nguyen et al., 2008).

### 4. Envenomation attributed to *V. velutina*

Search of French Poison Control Center database turned up only one case of envenomation involving hornets positively identified as *V. velutina*. On September 12, 2007, a 55-year-old farmer living near Langon in the Gironde department was attempting to destroy a *V. velutina* nest that he had found. Although the rest of his body was protected, he had forgotten to put on the face and head protector that he usually wore during such operations. He was stung a total of 12 times on the head including 7 stings in the occipital region. The patient ran away from the nest and experienced malaise. At the arrival of the rescuers severe isolated arterial hypotension was reported. At the emergency room, volume expanding solution, adrenaline and corticosteroids were administered and led to rapid regression of symptoms with normalization of arterial blood pressure. Immediately after recovering the patient complained of pain in the occipital region. Following the accident the patient complained of disabling headache episodes that always began with pain in the occipital region. Seeing no improvement he finally consulted a neurologist in October 2007. The diagnosis was neuralgia due to local inflammation resulting from the large quantity of venom injected during the hornet attack. With follow-up of more than one year the patient showed no spontaneous improvement (amitriptyline treatment for pain relief since November 2008 without real improvement).

### 5. Study of hymenoptera envenomations recorded by Poison Control Centers in France

*Method of data collection.* Since the offending hymenoptera species cannot be identified in most cases, all cases involving hymenoptera stings recorded at French Poison Control Centers from January 2004 to December 2008 were

**Table 1**

Experience of the French Poison Centers concerning the number of hymenoptera stings. The cell is grey when the department is colonized by *Vespa velutina*. The number between brackets is the number of stings for 100 000 inhabitants (data adjusted every year). There are since several years a high number of stings in the Haute-Garonne department (agricultural and densely populated department). There is no special surveillance in this area and this phenomenon existed before the arrival of the Asian hornet in this department in 2007. These data do not modify the study result.

| French departments   | 2004      | 2005       | 2006       | 2007      | 2008      |
|----------------------|-----------|------------|------------|-----------|-----------|
| Lot-et-Garonne       | 4 (1.27)  | 3 (0.94)   | 1 (0.31)   | 4 (1.25)  | 1 (0.31)  |
| Lot                  | 3 (1.8)   | 2 (1.19)   | 2 (1.19)   | 2 (1.19)  | 0         |
| Charente             | 0         | 0          | 2 (0.58)   | 0         | 0         |
| Charente Maritime    | 3 (0.51)  | 2 (0.34)   | 3 (0.5)    | 2 (0.34)  | 0         |
| Corrèze              | 1 (0.42)  | 0          | 0          | 0         | 1 (0.42)  |
| Dordogne             | 2 (0.5)   | 3 (0.75)   | 4 (0.99)   | 9 (2.24)  | 4 (0.99)  |
| Haute-Garonne        | 79 (6.94) | 110 (9.52) | 113 (9.66) | 45 (3.85) | 85 (7.27) |
| Gers                 | 3 (1.68)  | 3 (1.67)   | 4 (2.22)   | 0         | 0         |
| Gironde              | 41 (3)    | 33 (2.4)   | 22 (1.59)  | 24 (1.73) | 21 (1.51) |
| Landes 40            | 12 (3.41) | 2 (0.56)   | 3 (0.83)   | 1 (0.28)  | 1 (0.28)  |
| Pyrénées Atlantiques | 8 (1.28)  | 5 (0.8)    | 5 (0.79)   | 1 (0.16)  | 4 (0.63)  |
| Hautes Pyrénées      | 0         | 1 (0.44)   | 5 (2.17)   | 1 (0.43)  | 2 (0.87)  |
| Tarn et Garonne      | 5 (2.28)  | 3 (1.36)   | 6 (2.69)   | 1 (0.45)  | 4 (1.79)  |
| Aveyron              | 1 (0.37)  | 4 (1.48)   | 5 (1.84)   | 2 (0.74)  | 0         |
| Cantal               | 0         | 0          | 0          | 0         | 0         |
| Creuse               | 1 (0.8)   | 0          | 1 (0.82)   | 0         | 0         |
| Gard                 | 7 (1.05)  | 7 (1.03)   | 8 (1.17)   | 6 (0.88)  | 8 (1.17)  |
| Hérault              | 9 (0.93)  | 9 (0.92)   | 9 (0.91)   | 7 (0.7)   | 2 (0.2)   |
| Tarn                 | 5 (1.39)  | 2 (0.55)   | 9 (2.47)   | 1 (0.27)  | 2 (0.55)  |
| Haute Vienne         | 4 (1.1)   | 0          | 3 (1.82)   | 1 (0.27)  | 0         |

included. These data were collected from the National Bank of Poisoning Cases (French acronym, BNCI) in the shared data storage system (French acronym, SICAP). Data obtained before and after invasion by the Asian species were compared.

**Results.** Data presented in Table 1 show that no change occurred in the number of hymenoptera envenomations recorded in the departments affected by Asian hornet invasion. There was no increase in either the absolute number or the number of cases in relation to the population of the department (maps presented in the Internet report: [http://www.centres-antipoison.net/CCTV/Rapport\\_CCTV\\_Vespa\\_velutina\\_2009.pdf](http://www.centres-antipoison.net/CCTV/Rapport_CCTV_Vespa_velutina_2009.pdf)).

## 6. Discussion

Published data concerning *V. velutina* are sparse but tends to show that this Asian black hornet is not a medical threat in Asia. Ethological data collected by French entomologists indicated that the strain imported in Europe is not particularly aggressive toward man (Villemant et al., 2006a,b). To check this reassuring hypothesis, we studied data recorded by French Poison Control Centers to determine if introduction of this new species had impacted the number of hymenoptera stings seen in clinical toxicology units. Findings showed no increase in the number of hymenoptera stings in any of the French departments where the species had been introduced. The only envenomation clearly attributed to *V. velutina* occurred while the victim was attempting to destroy a live nest.

Although this case shows that the Asian hornet can be harmful, it appears that severe envenomations occur only under special circumstances that are the same as those surrounding attacks by native French species, i.e., multiple stings, single stings on mucosa, and allergic reactions. Concerning allergy it should be underlined that there is no available data on the risk of reaction to stings by the Asian black hornet. However since both European and Asian

species belongs to the same genus, it is likely that stings could be dangerous for persons that have been sensitized to hymenoptera venom due to cross-reaction.

## 7. Conclusion

The data presented here appears to assuage fears that the invasion of mainland France by *V. velutina* might have the same impact as that of the so-called Africanized hybrid bee in America with aggressive behavior and an increase in the number of multiple stings and of multiple organ complications. A review of data in the affected French departments indicated that there has not been an increase in the number of stings after 1 to 4 full life cycles and that envenomation by the Asian hornet exhibits the same severity as envenomation by native species. Given the speed with which *V. velutina* is spreading in France, it seems highly likely that it will cross the borders into Spain and Italy where the climate will be even more favorable for its development. This may have already occurred.

## Conflict of interest

The authors declare no conflict of interest.

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