Report on the analysis of the first Asian Hornet nests found in Ireland

Prepared by the National Museum of Ireland for the Asian Hornet Management Group

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Executive Summary

Two nests of the invasive hornet *Vespa velutina* were successfully tracked and removed from Cork City and Cobh by the National Parks & Wildlife Service (NPWS) in 2025. On behalf of NPWS and under the auspices of the Asian Hornet Management Group (AHMG), both nests were subsequently examined by the National Museum of Ireland's (NMI) entomologist.

The aims of the analysis were to: (1) describe the structure and demographics of the first Irish *V. velutina* colonies, (2) determine whether the nests may have produced reproductively viable hornets before they were destroyed and (3) prepare samples for genetic analysis.

The Cork City nest was larger than average for the season, whereas the Cobh nest was smaller than average. Colony size estimates ranged between *ca* 8,000 and 10,000 individuals for the Cork City nest, and between *ca* 2,000 and 2,250 individuals for the Cobh nest.

Both nests contained all brood stages (eggs, larvae, pupae, tenerals and adults) but neither showed evidence of reproductive activity: there was no differentiation in brood cell size to suggest gyne/male development; no bimodal size distribution was measured in adult females (indicating only workers were present; *ie* no gynes), and only two immature (non-viable) males were found in the Cobh nest.

The Cobh colony exhibited irregular brood patterns suggestive of earlier queen abandonment, whereas the Cork City nest displayed typical late summer organization. A single large female from the Cork City nest was presumed to be the founding queen. Taken together, these findings demonstrate that neither colony had entered the reproductive phase of its life cycle, and that the development or release of reproductively viable males or gynes from either colony was not imminent. Furthermore, post-control trapping at both sites yielded only workers.

The swift tracking and removal of both nests by NPWS rangers averted the possibility that either nest could give rise to any further colonies.

Background

Vespa velutina (Lepeletier, 1836), commonly known as the Yellow-Legged or Asian Hornet, is a social wasp species (Hymenoptera: Vespidae: Vespinae) native to Southeast Asia. The species was accidentally imported into France in 2004 and has since spread across most of western and central Europe, with records from at least 12 EU countries[1]. *Vespa velutina* was first recorded in Ireland in 2021 when a single hornet was discovered in a house in Dublin[2]. No further sightings occurred until August 2025, when another single hornet was photographed in Cork City. The Asian Hornet Management Group (AHMG), chaired by the National Parks & Wildlife Service and supported by the National Biodiversity Data Centre (NBDC), National Museum of Ireland – Natural History (NMINH), and Department of Agriculture, Food & the Marine (DAFM), was convened to investigate this sighting, which led to the discovery by NPWS Rangers of an active nest in Cork City following an intensive period of monitoring. After the discovery of the Cork City nest, reports of hornets arose from Cobh, approx. 13 km to the south-east. Rangers from the NPWS then tracked down and controlled a second Irish nest in this area. Studying the nests can give important insight into the developmental stage of the colony. Crucially, from the perspective of informing future management decisions, nest analysis can reveal whether the colonies were in the reproductive phase of their natural life cycle. Both nests were thus dissected and analysed by the NMINH entomologist on behalf of the AHMG to address the following aims:

1: Characterise the first Irish nests of *Vespa velutina*

2: Study colony demographics to determine whether the nests were reproductively active

3: Collect and preserve sufficient samples for future morphological and genetic analyses

Methods and Results

Nest Characteristics

The nests were dissected and analysed at the stores of the NMINH following a period of quarantine at -20˚C. Internally, hornet nests contain several carton combs linked together vertically via rigid pillars. The combs contain brood (eggs, larvae and pupae) which are cared for by adult worker hornets. The internal nest structure is protected by an outer envelope layer of brittle carton material, approx. 6 cm thick, formed from a mix of bark, wood pulp and saliva (Fig. 1). The physical characteristics of both Cork and Cobh nests are given in Table 1.

Both nests were mature, secondary nests containing between 5 and 7 active brood combs (Fig. 2). Each nest represented opposite ends of the average size ranges reported for *V. velutina* nests[3, 4]; with the Cork City nest being larger than average and the Cobh nest being smaller than average for the time of year.

Figure 1. Nest from Cork City with outer envelope partially removed to show the internal brood combs

Table 1. Physical measurements of *V. velutina* nests

	Cork City	Cobh
Height	58 cm	30 cm
Circumference at widest point	126 cm	94 cm
Volume	34 L	14 L
No. brood combs	7	5
Total surface area of brood combs	4230 cm^2	680 cm^2

Figure 2. Cork City nest **(left)** and Cobh nest **(right)** dissected to show internal brood combs. Note that both nests are shown here on the same scale; highlighting the size difference between the Cork and Cobh colonies.

Colony Analysis

Both nests were analysed following established methodologies[3, 4] to estimate the size of each colony, and to determine the developmental stage during which the nests were destroyed. All life stages were present in both nests, including eggs, larvae, pre-pupae, pupae, tenerals and mature adults (Fig. 3; see also **Glossary** on P. 9). Nest demographics and colony size estimates are given in Table 2.

Figure 3. Developmental stages of *V. velutina*. **A:** egg, **B-D:** larvae (three instars, or growth stages are shown), **E-F:** pupae (both early and late stages are shown), **G:** teneral adult and **H:** adult (worker). Scale bar = 5 cm

Table 2. Nest demographics and colony size estimates

	Cork City	Cobh
No. eggs	5423	1124
No. larvae	498	308
No. pupae	1734	338
No. cells with meconium	2065	481
Colony size estimate (lower – upper)	7990 – 9720*	1900 – 2250*

* = upper estimate when pupae are included

The brood was arranged in regular patterns in the Cork City nest (Fig. 4A), which is typical of mature hornet nests in late summer[4]. The Cobh nest brood pattern was irregular (Fig. 4B). No differentiation was seen in the width or height of brood cells in either nest, showing that the colonies were not yet at the developmental stage where males and/or gynes were being produced. Thus, the irregular brood pattern seen in the Cobh nest is more likely to reflect abandonment by the queen earlier in the season[3], than to reflect a nest entering a reproductive phase[4].

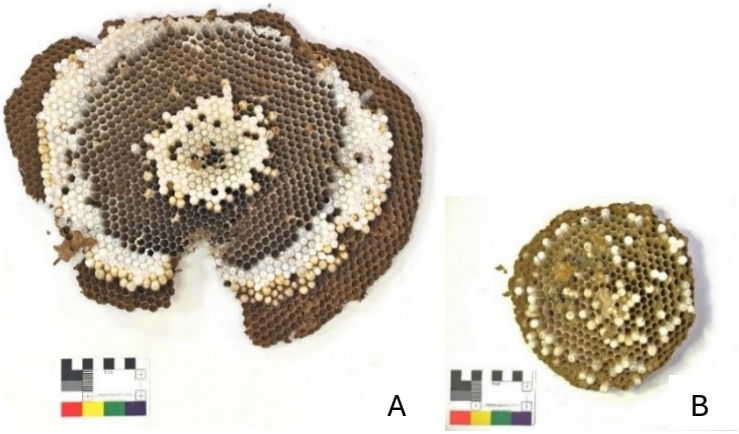

Figure 4. Combs from inside the Cork City **(A)** and Cobh **(B)** hornet nests showing regular and irregular brood pattern

Two immature male specimens (one late-stage pupa and one teneral adult) were removed from capped cells in the Cobh nest. Otherwise, no males were discovered in either nest, or in any of the traps deployed to monitor the nest sites post-control.
To examine whether gynes may have been present in either nest, adult females were weighed and their mesoscutum widths were measured (gynes are larger and heavier than workers[5]). For the Cork City nest, a sample of 50 specimens were measured. For the Cobh nest, only 11 adult female specimens were present and all were measured. No bimodal distribution was observed for either variable for either nest (Fig. 5), indicating that all females present belonged to the same (worker) caste (Table 3).

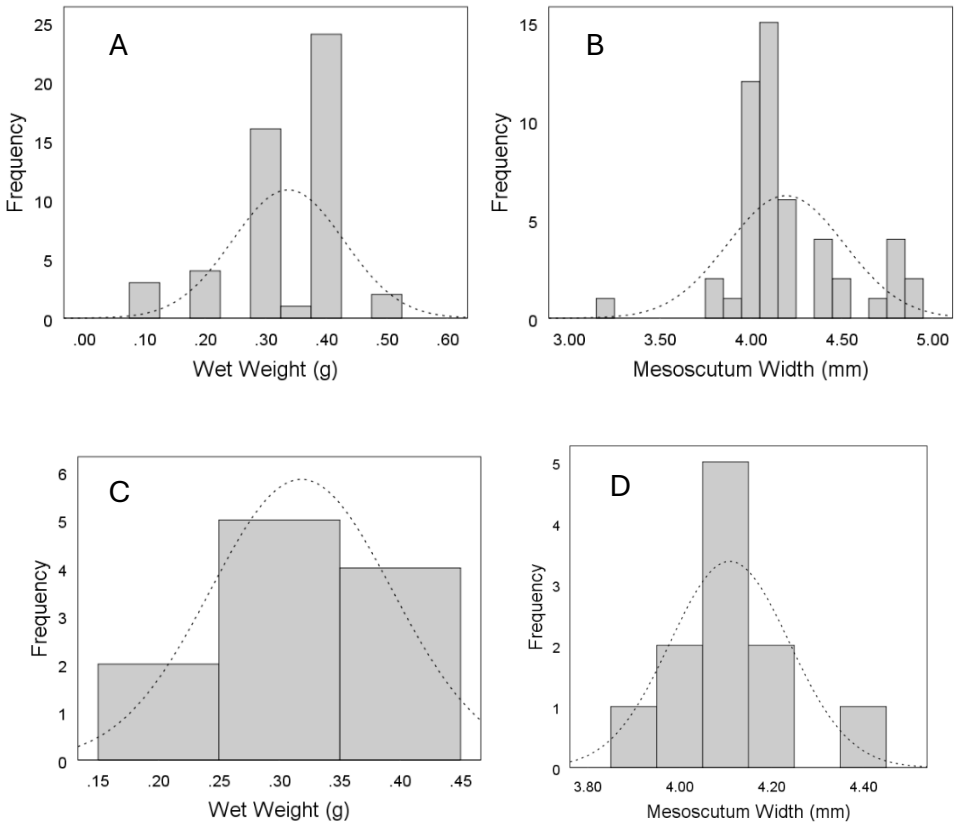

Figure 5. Wet weights and mesoscutum widths of adult females from the Cork City nest (**A-B;** *n* = 50 specimens) and Cobh nest (**C-D;** *n* = 11 specimens)

Table 3. Average measurements (Mean ± Standard Deviation) of adult females

	Cork City	Cobh
Wet weight (g)	0.34 ± 0.10	0.32 ± 0.08
Pronotum width (mm)	4.19 ± 0.32	4.11 ± 0.13

A single female from the Cork nest weighed 0.5 g and had a mesoscutum width of 5 mm (compared to the nest means of 0.34 ± 0.1 g and 4.19 ± 0.32 mm). This larger specimen also had a noticeably shiny abdomen and is presumed to be the original nest queen (Fig. 5). No such 'large' females were recovered from the Cobh nest.

Figure 5. Suspected queen (left) from the Cork City nest, compared to a worker (right). Note the relatively distended and shiny abdomen, and the hunched thorax of the suspected queen.

Conclusions

Analysis of Ireland's first confirmed *Vespa velutina* nests from Cork City and Cobh shows that neither colony had entered a reproductive phase of its life cycle. Genetic analysis will reveal whether any of the eggs, larvae or early-stage pupae extracted were male or female, and whether the large female from the Cork nest was the colony foundress. Regardless, the release of any reproductively viable individuals from either nest was certainly not imminent, as evidenced by the lack of any mature males, any suspected gynes, or any differentiation in shape or size of the brood cells to suggest that anything other than workers were developing. Furthermore, all of the specimens recovered from post-monitoring traps at both sites were workers.

There is some evidence that the Cobh nest had failed and was abandoned by its queen. Genetic analysis of the two immature males recovered from this nest will show whether they were diploid; thus being reproductively non-viable.

The overall rapid response by the members of the AHMG and the timely tracking, detection and control of both nests by NPWS rangers almost certainly prevented the release of males and gynes, thus averting the possibility that further colonies could arise from either nest. This positive outcome highlights the importance of early detection, rapid response, and careful analysis for preventing the establishment of an Irish *V. velutina* population.

Glossary of biological terms

Abdomen: the 'tail' or rear section of the hornet's body
Brood: collective term for the offspring of hornets (see Fig. 2)
Colony: collective term for all hornets within a single nest
Gyne: a reproductively viable female hornet. Gynes can become future queens
Larva: the grub-like young of hornets (see Fig. 3, B-D)
Meconium: remains of larval gut contents at the bottom of a brood cell
Mesoscutum: upper area of the thorax between each wing
Pre-Pupa: final larval stage, appearing as a large larva in a capped brood cell
Pupa: developmental stage between the larval and adult hornets (see Fig. 3, E-F)
Queen: the colony-founding, egg-laying female in a hornet nest
Teneral: newly-developed adult hornets that have not yet emerged from brood cells (see Fig. 3, G)
Thorax: the middle section of the hornet's body; between the head and abdomen
Worker: a non-reproducing female hornet (see Fig. 3, H)

References

[1] European and Mediterranean Plant Protection Organization (2025) Update on the situation of the Asian hornet Vespa velutina in Europe. EPPO Reporting Service no. 05 – 2025 Num. article: 2025/122. Available online: https://gd.eppo.int/reporting/article-8135

[2] Dillane E, Hayden R, O'Hanlon A, Butler F, Harrison S (2022) The first recorded occurrence of the Asian hornet (*Vespa velutina*) in Ireland, genetic evidence for a continued single invasion across Europe. *Journal of Hymenoptera Research*, **93,** 131-138

[3] Rome, Q., Muller, F.J., Touret-Alby, A., Darrouzet, E., Perrard, A. and Villemant, C. (2015) Caste differntiation and seasonal changes in *Vespa velutina* (Hym.: Vespidae) colonies in its introduced range. Journal of Applied Entomology, 139: 771-782

[4] Diéguez-Antón A, Escuredo O, Seijo MC, Rodríguez-Flores MS. (2022) Embryo, Relocation and Secondary Nests of the Invasive Species *Vespa velutina* in Galicia (NW Spain). *Animals*, 12: 2781

[5] Pérez-de-Heredia I, Darrouzet E, Goldarazena A, Romón P, Iturrondobeitia J-C (2017) Differentiating between gynes and workers in the invasive hornet *Vespa velutina* (Hymenoptera, Vespidae) in Europe. *Journal of Hymenoptera Research*, 60: 119-13