

## ***POLISTES NIMPHA* (HYMENOPTERA: VESPIDAE), ANOTHER PAPER WASP NEW TO BRITAIN**

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### ABSTRACT

The eusocial paper wasp *Polistes nimpha* (Christ) is formally added to the British list from a site in Warwickshire (2019) having previously been recorded in Jersey (2015). It represents the fourth species of *Polistes* found flying wild in Britain. A new key to British *Polistes* species is provided.

### INTRODUCTION

Reports of *Polistes* paper wasps in Britain are not new but there has been confusion regarding the precise species involved and the level of establishment. Richards (1980) listed what he considered to be certain records of *P. dominulus* [sic] from London and Kent but stressed that he could not be sure of the precise identity of older *Polistes* records from Hampshire and Durham, and this publication predates current understanding of the European species. Archer (2014) assigned most British records to *P. dominula* (Christ) but an Irish record initially published as *P. omisus* Weyrauch (McClenaghan, 1979) is referred to as *P. gallicus* (L.). Baldock & Dvořák (2009) provide some evidence that *P. dominula* could be established in parts of south-east England as far north as Suffolk. Identification of European *Polistes* at that point relied upon Dvořák & Roberts (2006). A more recent review of West Palaearctic *Polistes* by Schmid-Egger *et al.* (2017), underpinned by DNA sequencing, describes several new species, raising the list of European *Polistes* to 14, representing almost a doubling of species in less than 20 years (Pekkarinen & Gustafsson, 1999, only recognised eight species) and provides a new standard for the identification of material. Using this paper, Falk (2019) added *P. nimpha* (Christ) to the Channel Islands list from Jersey (recorded in 2015), and Hazlehurst (2020) added *P. biglumis* (L.) to the British list from Kent in 2020. This current paper reports the first record of *P. nimpha* from Britain, taking the list of British *Polistes* species to four.

### METHODS

On 21 August 2019, SG observed and photographed some male *Polistes* at Compton Verney House, Warwickshire (grid reference SP310528) (Fig. 1). SJF was able to visit the site with SG on 26 September to assess the population and obtain some specimens for critical checking, because identification of *Polistes* species purely from photography is not recommended. Over the course of about one hour, several dozen sightings of males (Fig. 1) flying about a small shrubbery and landing on sunlit foliage or wood were made. It is not clear precisely how many individuals were involved but the number suggested that nesting was occurring somewhere nearby. Despite careful searching, no females could be found (these are readily separable in the field because of their darker faces) and no nest was located.

Three males were taken and pinned, and a mid leg of one placed in 90% alcohol. Formal identification of the specimens was undertaken using Schmid-Egger *et al.* (loc. cit) and the leg was sent to Rob Paxton at Martin-Luther University, Halle-Wittenberg, Germany for sequencing at the mitochondrial CO1 gene. The pinned



Fig 1. One of the males of *Polistes nimpha* photographed at Compton Verney, Warwickshire.

specimens keyed out cleanly as *P. nimpha*, featuring the long and narrow last antennal segment and strongly formed lateral ridges of the clypeus, that characterise males of this species. The CO1 sequencing gave a definitive (99.83%) match to the *nimpha* barcode in BOLD and GenBank, which includes other *Polistes*, including *dominula*. The Warwickshire specimens were indistinguishable from the *nimpha* male from Jersey in the S. Falk collection. Correspondence with Mike Edwards and Jeremy Early of the Bees, Wasps and Ants Recording Society (BWARS) confirmed that this was the first definite record for *P. nimpha* in Britain.

### Identification

The following is a revised provisional key to all four British *Polistes* species based on Schmid-Egger *et. al.* (loc. cit.) and other information to hand.

- 1 Antennae with 12 segments, the apical one unmodified. Metasoma with 6 visible segments. Face broader and with black markings around the antennal sockets and often the clypeus (females) . . . . . 2
- Antennae with 13 segments, the apical one slimmer than the others and deflected ventrally. Metasoma with 7 visible segments. Face narrower and entirely yellow (males) . . . . . 5

- 2 Malar space yellow. Mandibles black (rarely with a small yellow patch). Clypeus somewhat wider than high medially. Hind coxa always black dorsally . . . . . 3
- Malar space black (rarely with a small yellow patch). Mandibles extensively yellow. Clypeus about as high as wide medially. Hind coxa often yellow-marked dorsally. . . . . 4
- 3 Antennae with flagellum darkened dorsally. Transverse yellow band of pronotum (across top of thorax behind the head) not becoming broader in the humeral areas and continuing narrowly down the sides of the mesosoma; typically fused to the oblique yellow lateral stripes of the pronotum. Mesoscutum usually without paired yellow spots. Last visible sternite black or reddish or yellow at apex only. Generally darker-looking . . . . . *nimpha*
- Antennae with flagellum completely orange except for the first segment dorsally. Transverse yellow band of pronotum widest in the humeral areas where it ends abruptly and does not continue narrowly down the sides of the mesosoma; not usually fused to the oblique yellow lateral stripes of the pronotum. Mesoscutum usually with a conspicuous pair of yellow spots. Last visible sternite entirely yellow. Generally a more extensively yellow-marked species. . . . . *dominula*
- 4 Antennae with flagellum blackish dorsally. Transverse yellow band of pronotum narrow throughout. Mesoscutum usually without paired yellow spots, and the oblique yellow lateral stripes of pronotum often missing. Yellow spots on propodeum narrow (i.e. separated by much more than their own width) or missing. Hairs of pronotum and mesoscutum longer (almost as long as the width of the anterior ocellus). Tegula usually with a dark spot. Generally darker-looking . . . . . *biglumis*
- Antennae with flagellum completely orange except for the first segment dorsally. Transverse yellow band of pronotum broadening at sides. Mesoscutum usually with a conspicuous pair of spots, and oblique yellow lateral stripes of pronotum usually present. Yellow spots on propodeum broader and separated by about their own width. Tegula usually entirely yellow. Hairs of pronotum and mesoscutum shorter (about half the width of the anterior ocellus). Generally a more extensively yellow-marked species . . . . . *gallicus*
- 5 Head viewed dorsally with temples narrowing immediately behind the eyes, straight-sided and without any inflation. Face in anterior view almost triangular, Latero-ventral margin of clypeus yellow (antennae with flagellum completely orange except for the first segment dorsally). . . . . *gallicus*
- Head viewed dorsally with temples inflated behind the eye and with sides curved. Face in anterior view trapezoid. Latero-ventral margin of clypeus darkened yellow) . . . . . 6
- 6 Apical antennal segment viewed dorsally about 3 times as long as wide (Fig. 2). Clypeus with very well-formed lateral ridges and distinctly depressed between these (Fig. 3). Raised median area of face between the clypeus and the antennal sockets with a distinct depression running down the middle. Antennae darkened dorsally like *biglumis* . . . . . *nimpha*
- Apical antennal segment viewed dorsally typically 1.5–2 times as long as wide. Clypeus with lateral ridges absent or very weak. Raised median area of face between the clypeus and the antennal sockets without a depression running down the middle. . . . . 7
- 7 Most of clypeus with long bristles and punctures. Antennae with flagellum completely orange except for the first segment dorsally. Apical antennal segment viewed dorsally stouter, about 1.5 times as long as wide. Hairs of pronotum and mesoscutum shorter (about half as long as the width of the anterior ocellus) . . . . . *dominula*



Fig. 2. Final segment of male antennae.



Fig. 3. Male face.

- Clypeus with long bristles and punctures restricted to the lower third. Antennae with flagellum darkened dorsally. Apical antennal segment viewed dorsally about twice as long as wide. Hairs of pronotum and mesoscutum longer (nearly as long as the width of the anterior ocellus). . . . . *biglumis*

The combination of a long and slender final antennal segment combined with well-developed lateral ridges on the clypeus, both physical characters, makes the males fairly easy to confirm. Females are more challenging because of a greater reliance on colour pattern. The combination of a yellow malar space and black mandibles (which help define the ‘*dominula* group’), combined with dorsally-darkened antennae, a dark sternite 6, and comparatively restricted yellow markings on the mesosoma and metasoma, provide ready distinction from *dominula* at the northern parts of their range. However, *nimpha* is considerably more yellow in parts of West Asia – and this supports a precautionary note: substantial variation in colour pattern affects many *Polistes* species across their Palaearctic, and in some cases European, range. *Polistes nimpha* and *P. dominula* are particularly affected. This means that individuals from a near-Continent source could look somewhat different to individuals brought in from SE Europe, West Asia or North Africa. What is more, there are several further very similar-looking European *Polistes* species not currently on the British list that could become imported. One of these, *P. albellus* Giordani Soika has already been recorded as close as Belgium (Schmid-Eggar *et al.*, loc. cit.). Others are well-established in parts of Europe that are just a few hours’ drive away in a refrigerated lorry. There is also much evidence that various *Polistes* species are expanding north naturally as a result of climate change (e.g. Barbier & Baugnée, 2002 and Baldock & Dvořák, 2009 for *P. dominula*) which is likely to increase the frequency with which they arrive into Britain from the near-Continent.

The Schmid-Eggar *et al.* (loc. cit.) review attempts to describe and negotiate intraspecific colour variation and will help discriminate extra species, or different colour forms of the four known British species, that might turn up in Britain. However, when SJF put his Cretan and Israeli *Polistes* material through this key (about a dozen female specimens) hardly any of them keyed out cleanly. This emphasises the importance of getting the DNA of any British material sequenced. That is best achieved by euthanizing an individual in a freezer for a few hours (ethyl acetate must not be used because it can damage DNA), then removing a mid leg and placing it immediately into a vial with 90% ethanol or industrial methylated spirits (with a data label written in pencil or archival ink) and storing this vial in a fridge until DNA-sequencing can be arranged.

#### ***Polistes nimpha* material examined**

*Jersey*: Mont Orgueil Castle (49.2007/-2.0184) 21 July 2015, 1 m.

*Warwickshire*: Compton Verney (SP310528) 21 Aug 2019, 3 m.

Supporting images for the above records can be found on Flickr: <https://www.flickr.com/photos/63075200@N07/sets/72157658086247212/>.

### ECOLOGY

#### **Foreign distribution**

Europe, north to S. Finland, Palaearctic Asia east to Mongolia, China, and Russian Far East (Schmid-Eggar *et al.*, loc. cit.). It does not extend as far north in Fennoscandia as *P. biglumus* or *P. dominula* i.e. it seems to be a little more thermophilic. However, like those two species, there has been a northward expansion in recent decades (e.g. Barbier & Renneson for Belgium in *Atlas Hymenoptera*). A

world map is provided by inaturalist: <https://www.inaturalist.org/taxa/339925-Polistes-nimpha>.

### Habitat

It seems to be fairly catholic in taste within its core area but in common with most *Polistes* avoids heavily wooded areas. It cannot exploit the more exposed montane and boreal environments used by *P. biglumis* (Pekkarinen & Gustafsson loc. cit.). In Jersey it was taken in a suburban coastal area with plenty of flowery grassland and scrub. In Warwickshire it was using the more formal gardens and parkland associated with a Capability Brown-designed setting.

### Flight Period

In Poland, *P. nimpha* emerges and starts to build nests from April until early May (Kozyra, Baraniak & Kasprowicz, 2016). Colonies begin to disintegrate in late summer following the emergence of males and decline throughout autumn.

### Eusocial behaviour and nesting

*Polistes nimpha* is a primitively eusocial species with poorly-differentiated queens, in common with the majority of *Polistes* species, though it should be noted that three European species (*P. atrimandibularis* Zimmerman, *P. austroccidentalis* Achterberg & Neumeyer and *P. semenowi* Morawitz) are social parasites of other *Polistes*. *P. nimpha* is relatively well-studied (especially in Poland) and a summary of the nesting behaviour is provided by Kozyra, Baraniak & Kasprowicz (2016). The foundresses usually build nests at a height of 10–20 cm above ground. These can be attached to assorted herbaceous plants (including grasses), dwarf shrubs such as heather *Calluna vulgaris*, thickets of shrubs and *Rubus* spp., young trees, and reed beds of *Phragmites australis*. The nest is attached by a more or less horizontal petiole so that the comb faces to the east and can warm up more rapidly in the morning sun. The nests comprise a single spherical comb constructed of wood pulp, as in vespine wasps, but there is no outer insulating envelope around the comb. Nesting can also be associated with man-made structures such as eaves of buildings or attics. Colonies on natural vegetation are usually haplometric (i.e. founded by a single queen), while some of the colonies associated with buildings are pleometric (i.e. with two or more queens assisting each other) (Cervo & Turillazzi 1985; Rusina *et al.*, 2007). Young nests are prone to predation by badgers, foxes and ants but this lessens as workers establish and defend the nests (Kozyra & Baraniak, 2016). Colonies do not normally exceed a few dozen individuals.

### Flower-visiting

The Jersey male was taken on the flowers of wild fennel *Foeniculum vulgare*. Images on the internet (some of which are clearly of male *P. nimpha*) indicate a variety of Apiaceae and Asteraceae (subfamily Asteroideae) species are used.

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## SHORT COMMUNICATION

**A Scottish and Irish ichneumonid wasp recorded in England.** – Whilst working on unsorted (loaned) Ichneumonidae from Manchester Museum I came across an interesting looking species of the *Ichneumon* genus, particularly notable due to extensive red markings on the thorax (not a common feature in the British species). The specimen had been collected by Harry Britten on 21.x.1928 from “Freshfield”, Lancashire, which at that time is likely to refer to dune areas between Formby and Ainsdale on the Sefton coast (Phil Smith, pers. comm.).

The species keyed out well in Perkins (1960) to *Ichneumon walkeri* (Wesmael) – which is known currently as *Ichneumon stigmatorius* (Zetterstedt) and included on the UK checklist (Broad, 2016). It keyed out less satisfactorily using Hilpert (1992) – Hilpert describes the mesonotum as usually being black – but was obviously close (morphologically) to similar species in that key (Group I in Hilpert's key) and Hilpert does state it to be “very variable”. Perkins listed the species for Scotland and the checklist (Broad, 2016) noted Scotland and Ireland. With no obvious records for England I thought best to send it to Gavin Broad to check the determination. Gavin kindly checked and confirmed the identity of the specimen.