THE SPIDER WASP, *AGENIOIDEUS APICALIS* (HYMENOPTERA: POMPILIDAE) NEW TO BRITAIN, AND A SECOND BRITISH RECORD OF *AGENIOIDEUS SERICEUS*

DAVID G. NOTTON

Department of Life Sciences, The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom
d.notton@nhm.ac.uk.

ABSTRACT

The spider wasp, *Agenioideus apicalis* (Vander Linden), is reported as new to Britain based on one specimen collected in the garden of the Natural History Museum, London. Morphological characters are given, and illustrated, to establish its identity and a key is provided to distinguish it from other British Pompilidae. Notes are provided on bionomics and its status in Britain. Two previously reported putative British specimens of *A. apicalis* collected in the mid-19th century were re-examined and their provenance is shown to be doubtful, and most likely of southern European origin, based on evidence of labelling, historical evidence of provenance and the known distribution of *A. apicalis* elsewhere in Europe. A second British specimen of *Agenioideus sericeus* (Vander Linden) is reported.

INTRODUCTION

Knowledge of the composition of the British Hymenoptera fauna is essential for the purposes of biological studies requiring accurate identifications, and their applications, including conservation of native species and the monitoring of faunal change and non-native invasive species. The British spider wasp fauna has been relatively stable since Day's (1988) thorough identification handbook for Pompilidae, with only two more species, *Agenioideus sericeus* (Vander Linden) and *Episyron gallicum* (Tournier) added since then (Baldock, 2006). It is gratifying therefore to report the spider wasp, *Agenioideus apicalis* (Vander Linden) here as new to Britain. Morphological characters are given, and illustrated, to establish its identity and a key is provided to distinguish it from other British Pompilidae. Notes are provided on bionomics and its status in Britain. *A. apicalis* had previously been reported as British (Smith, 1851) under the synonym *Pompilius acuminatus*, although the locality was considered doubtful by Day (1988), and it has not been regarded as a British insect in recent times. The two previous specimens which had been regarded as British, including the holotype of *Pompilius acuminatus* Smith, 1851, said to have been collected in Scotland, were traced, re-examined, confirming that that their provenance is not certain. Evidence of the historical distributions of this species shows these specimens are most unlikely to be British. Based on only one genuine British specimen so far, the status of *A. apicalis* in Britain is uncertain, but is possibly a recent colonist from continental Europe where it has been expanding its range. A second British specimen of *Agenioideus sericeus* is reported.

METHODS

Initially one male specimen of *Agenioideus apicalis* was collected by hand netting during surveying for aculeate Hymenoptera in the west garden of the Natural

History Museum. Following identification (as described below) and literature search it was realised that the species had formerly been regarded as British, and the two previous putative British specimens were located in The Natural History Museum, London, UK (NHMUK) and the Oxford University Museum of Natural History, Oxford, UK (OUMNH) and examined. Since one of them was reputedly Scottish, the entomology collection of the National Museum of Scotland was examined but no additional specimens were found. Specimens from NHMUK used in the study were assigned unique NHMUK specimen numbers. Imaging was undertaken using a Canon EOS 450D digital camera connected to a Zeiss Stemi SV11 stereomicroscope; images were processed with Helicon Focus image stacking software. Specimen data and images for NHMUK specimens were recorded on the NHMUK database, and are publically available through the NHMUK Data Portal (Natural History Museum, 2014). Data for the specimen from Stephens' collection were checked against the NHMUK accession register. Plants visited were identified using Stace (2010).

For students of the British fauna a key to separate all three known British *Agenioideus* is presented below, translated and adapted from Gros & Wahis (2002) and Nieuwenhuijsen (2005). For those using Day (1988), it can be used to replace couplet 34 in the key to females and couplet 33 in the key to males. *Agenioideus sericeus*, reported from the Channel Islands by Day (1988) is now known from mainland Britain (Baldock, 2006) and a second British specimen reported below.

Key to British species of *Agenioideus*

Females

1 Posterior half of propodeum with strong transverse striations (Plate 1, Fig. 1); anterior tarsus without a distinct comb; ventral clypeal margin almost semicircular (cf. Plate 1, Fig. 2). Body length 7–13 mm . . . . . ***Agenioideus apicalis* (Vander Linden, 1827)**

– Posterior half of propodeum without transverse striations; anterior tarsus with a distinct comb, comprising at least one long spine on each of tarsal segments one to three; ventral clypeal margin almost trapezoidal 2

2 Clypeus, frons and pronotum with yellow marks; legs mostly orange-red; fore tarsus with a comb of three to four spines, the comb spines shorter; ocelli forming an acute angle; propodeum matt; body length 4–7 mm . . . . . ***Agenioideus cinctellus* (Spinola, 1808)**

– Head and pronotum without yellow marks, entirely black; legs all black or dark brown; fore tarsus with a comb of five to six long spines, the comb spines longer; ocelli forming a right angle or slightly obtuse angle; propodeum shining; body length 6–9 mm . . . . . ***Agenioideus sericeus* (Vander Linden, 1827)**

Males

1 Ventral clypeal margin semicircular (Plate 1, Fig. 2); propodeum (Plate 1, Fig. 3); wings (Plate 1, Fig. 4); apex of metasoma (Plate 1, Fig. 5); genitalia (Plate 1, Fig. 6); body length 5–7.5 mm . . . . . ***Agenioideus apicalis* (Vander Linden, 1827)**

– Ventral clypeal margin trapezoidal 2

2 Subgenital plate with a long narrow keel along its whole length, apex of plate pointed; tibia three usually with a sub-basal white spot; upper face usually with a small white spot next to compound eye; body length 4–5 mm. . . . . ***Agenioideus cinctellus* (Spinola, 1808)**

– Subgenital plate flat, without a medial keel along its length (at most slightly raised medio-basally), apex of plate blunt; tibia three dark; face black; body length 4.5–6 mm . . . . . ***Agenioideus sericeus*** **(Vander Linden, 1827)**

AGENIOIDEUS Ashmead, 1902

Agenioideus (*Agenioideus*) apicalis (Vander Linden, 1827) Plate 1, Figs 1–8.

Identification

This study was initiated following the discovery of an unusual spider wasp in the NHMUK west garden. This wasp could not be satisfactorily identified using the most recent key to the British Pompilidae (Day, 1988) and was evidently not included in that work, nor did it agree with specimens of any of the previously known British species of Pompilidae in the NHMUK, as listed in the recent British and Irish checklist (Else, Broad & Bolton, 2016). In Day (1988) the specimen ran to couplet 33 in the key to males which is the couplet for the genus *Agenioideus* however it did not agree with either *A. cinctellus* or *A. sericeus*. The generic placement was confirmed as *Agenioideus* using the key of Loktionov & Lelej (2015). Using keys for the north-west European fauna (Gros & Wahis, 2002; Nieuwenhuijsen, 2005) it keyed easily to *Agenioideus apicalis*. This was confirmed by comparison with named specimens in the NHMUK collection, including specimens determined by H. Wolf and M. C. Day.

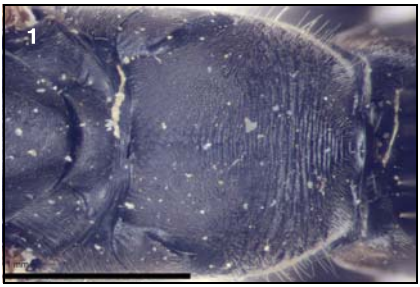
Field recognition of *A. apicalis* relies on subtle characters: the female (Plate 1, Fig. 7) is robust and all black with strongly infuscate fore wings lightened at the apex, the distinctive striate propodeum is hard to see as it is concealed by the wings when folded, however an association with walls and spiders of the genus *Segestria* may suggest this species; the male (Plate 1, Fig. 8) has a superficial resemblance to that of *Caliadurgus fasciatellus* (Spinola) (the form with a dark face) in the lightly infuscate subapical fascia on the forewing, reddish brown hind femora and white spot on the seventh gastral tergite, but can be separated by the black hind tibial spurs (white for *C. fasciatellus*) and strong medial carina on the subgenital plate (flat in *C. fasciatellus*) which should be visible using a good hand lens.

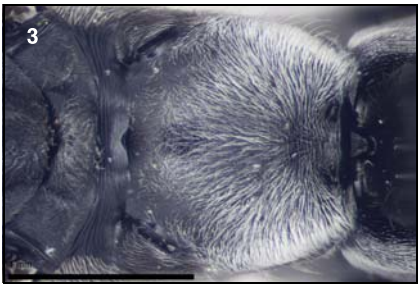
Material seen

ENGLAND: London, Natural History Museum, TQ26647901, ♂, 13.vii.2016, at flowers of *Daucus carota*, D. G. Notton (NHMUK010264906). **FRANCE:** Var, Frejus, ♀, 30.vi.1968, K. M. Guichard (NHMUK010264966). *Country uncertain*: as 'British' in error, ♂, pre-1853, J. F. Stephens (NHMUK010264965); as 'Scotland, Loch Rannoch' in error, ♂, pre-1851, W. Little (OUMNH).

Distribution

Agenioideus apicalis is recorded as new to Britain on the basis of the one specimen from the NHMUK garden, London. Previous British records are erroneous (see discussion below). Elsewhere in Europe this species is widespread in Mediterranean Europe (Mitroiu & Wahis, 2013) but extends northwards into Belgium (Gros & Wahis, 2002); Czech Republic (Straka, 2000); France (Gros & Wahis, 2002) confirmed here; Germany (Wolf, 1999); Netherlands (Peeters *et al.*, 2004; Nieuwenhuijsen, 2005); Russia (Mitroiu & Wahis, 2013); Sweden (Abenius, 2002); Switzerland (Mitroiu & Wahis, 2013) and appears to have been spreading northwards since the mid-20th century.





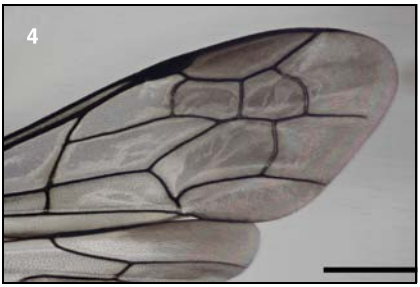


PLATE 1. Figures 1–8. *Agenioideus apicalis*. 1. Propodeum, dorsal, ♀, NHMUK010264966; 2. Face, ♂, NHMUK010264965; 3. Propodeum, dorsal, ♂, NHMUK010264906; 4. Right fore wing, dorsal, ♂, NHMUK010264906; 5. Apex of metasoma, lateral, ♂, NHMUK010264965; 6. Genitalia, ♂, NHMUK010264906; 7. Habitus, dorsal, ♀, NHMUK010264966; 8. Habitus, dorsal, ♂, NHMUK010264906. All scale bars 1 mm. Figure credits all David G. Notton, NHMUK.

Habitat

The habitat where the London specimen of *Agenioideus apicalis* was collected is a piece of grassland immediately in front of the west wing of the Waterhouse building at the NMHUK, managed as a wildflower meadow by staff of the Museum's Wildlife Garden (Ware *et al*., 2016). This area is often very warm as it is south facing and receives reflected heat from the building front.

Bionomics

Agenioideus apicalis has one generation per year, flying from June to September (Peeters *et al*., 2004). Gros (1983) recorded the spiders *Segestria bavarica* C. L. Koch and *S. florentina* (Rossi) (both Segestriidae) as prey and in addition to *Segestria* spp. *Marpissa muscosa* (Clerck) (Salticidae) was noted by van Breugel (2014). Occurring naturally in rocky habitats where these spiders live, also in ecologically equivalent man-made habitats, such as walls with crevices where the spider prey can make their retreats (Abenius, 2002). Besides natural cavities *A. apicalis* has been known to nest in drilled wood block bee hotels, closing the nest with wood fragments (van Breugel, 2014).

Status in Britain

The recently collected specimen from the NHMUK garden clearly justifies placing *Agenioideus apicalis* on the British list, however, two allegedly British specimens had been recorded previously by Smith (1851, 1855, 1858) under the synonym *Pompilius acuminatus* but later generally not considered British, as explained by Day (1972); however in the light of the new specimen the status of these previous two specimens is re-evaluated here.

Day (1972) located the two specimens mentioned by Smith, two males, one in the OUMNH, the other in NHMUK. The first specimen he considered almost certainly the type (Day, 1972), was initially recorded by Smith (1851) as from Kirkpatrick Juxta (now Dumfries, Scotland) but was later labelled by Smith as 'Scotland, Loch Rannoch'. The second specimen in NHMUK was without original labels, or even any specific locality. Day considered *Agenioideus apicalis* to be 'a most unlikely member of the British pompilid fauna' because of the lack of original labels on these specimens and subsequent confusion over localities and because the species then had a more southern distribution in Europe, not then extending into Northern Germany or Scandinavia.

The two specimens were re-examined here and it is possible to add some further details to Day's account. Firstly the OUMNH specimen which became the type of *Pompilius acuminatus* was sent to Smith by Reverend William Little (1797?–1867) (Service, 1896; Hancock, Dobson & Williams, 2009) who lived at Kirkpatrick Juxta. There are known to be problems with the localities of Little's specimens (Hancock, Dobson & Williams, 2009), apparently his specimens were not always labelled; this appeared to be the case here and it seems likely that Smith (1851) assumed Little had collected it near his home, and reported the locality as Kirkpatrick Juxta. The locality label 'Scotland, Loch Rannoch' on the type now, is in Smith's hand so must have been added later, probably at the suggestion of Little. The second specimen which came to the NHMUK via the collection of James Francis Stephens (1792–1852) has no original locality label, although it bears a small oval label as was added to specimens considered British by early NHMUK curators, so it must have come from Stephens' British collection. Circumstantial evidence suggest that this specimen also originated from Little because it has the same kind of pin as the type, was set in a similar position, reached the NHMUK within a few years of the first specimen

reaching Smith, and also Little and Stevens were closely connected (Murray, 1853). In the absence of an original locality label, Stephens similarly may have assumed the specimen was British.

The British origin of these two specimens cannot therefore be confirmed from either their labels or the history of the specimens because there are no original data labels and the claimed localities are doubtful: the Kirkpatrick Juxta locality was erroneously assumed by Smith (1851) but later understood by him to be erroneous and corrected; the corrected locality of Loch Rannoch was added much later by Smith, not by Little, probably following correspondence with Little and based on Little's memory some years after collecting, and therefore not certain. Furthermore Little had the opportunity to collect in Switzerland where *Agenioideus apicalis* certainly does occur. According the Hancock, Dobson & Williams (2009) Little had visited Switzerland, also the entomology accession registers for the NHMUK record a gift by a Reverend W. Little of Hymenoptera and Diptera from Switzerland in 1851 (register number B.M.1851-67), the same year as Smith's description of *Pompilius acuminatus,* and so it seems both the putative British specimens seen by Smith could have been unlabelled Swiss specimens.

Day's (1972) view that *Agenioideus apicalis* was unlikely to be British because of its southerly distribution in Europe seems to support this, but must now be reconsidered given that this species has been collected in Britain, and also in Sweden (Abenius, 2002) from the Koster Islands (decimal latitude 58.9 N) further north even than Loch Rannoch in Scotland (decimal latitude 56.7 N). However it appears that Day was correct because *Agenioideus apicalis* has only expanded its distribution northwards in the latter part of the 20th century, as have many other aculeate Hymenoptera. Following thorough surveying of thousands of specimens Wolf (1999) only reported it in southern Germany only after 1950 although with some subsequent fluctuations in numbers. Similarly Gros and Wahis (2002) report it as rare in Belgium before 1950, but much commoner after that. Abenius reported it in southern Sweden (2002) in a thermic low altitude coastal site and did not find any prior records. Abenius expressed some doubt about the locality of his specimen but it does not seem so surprising if it is, together with the latest British record reported here, the vanguard of a significant northwards range extension.

The reasons for this northwards expansion may reflect warming climate, which in turn may have increased prey availability. This is supported by climate records such as the mean central England temperature (Parker, Legg & Holland, 1992; Legg, 2017) which was much cooler before 1950, suggesting Scotland would have been less suitable for this predominantly Mediterranean spider wasp in the 1850s and that the south of England would be more suitable now. Furthermore all three of the reported prey species *Segestria florentina, S. bavarica* and *Marpissa muscosa* have southern English distributions and would not have been found in Scotland in the 1850s, but at least one of them, *Segestria florentina* has recently expanded its range northwards in England (Harvey, Nellist & Telfer, 2002) so that at least the south of England is now more suitable for *A. apicalis*.

In summary, because of the evident doubts about the localities, and Little's practice of not labelling specimens, the fact that Little had opportunity to collect this species in Switzerland, because cooler climate would have made Scotland less suitable in the 1850s, and reduced the available prey species, it is reasonable to suppose that the putative British specimens of *A. apicalis* from the 1850's are not in fact British at all, and so it was not a previously native species. The new specimen reported here is likely a recent arrival from nearby continental Europe, where this species is currently found in northern France, the Netherlands and Belgium.

Nomenclature

Day (1972) expressed some reservations about the recognition of the OUMNH specimen as the type of *Pompilius acuminatus*, because of the inconsistent data labels, but later (Day, 1979) he considered it was certainly the holotype. The specimen was examined as a part of this study and agrees well with Smith's (1851) original description. The historical analysis above explains the sloppy labelling and subsequent confusion which resulted in the inconsistency in reported localities for this specimen, which should not prevent it from being a type. In agreement with Day (1979) there is therefore no reason not to consider this specimen as the holotype. It is possible to add that it is a holotype by monotypy since the comments of Smith (1851, 1855, 1858) show that when he made the original description he was in possession of only one specimen. The type locality must also be revised: certainly it is not Scotland; possibly it should be Switzerland.

Agenioideus (*Agenioideus*) *sericeus* (Vander Linden, 1827)

Material seen

ENGLAND: London, Lewisham, TQ376762, ♀, 20.vii.2016, garden, D. G. Notton (NHMUK010812488).

Notes

Identification was made from Day (1988) and confirmed by reference to Gros & Wahis (2002) and Nieuwenhuijsen (2005). This is the second specimen recorded from mainland Britain following Baldock's (2006) specimen from Midhurst, Sussex, in 2005, and suggests that it may be establishing.

Previous reports of *Agenioideus sericeus* as a British insect by Saunders (1896, as *Pompilius sericeus*; Richards & Hamm, 1939; Kloet & Hincks, 1945) are actually misidentifications of the two putative British specimens of *Agenioideus apicalis* discussed above; the confusion was caused by Saunders' erroneous synonymy of the two species. Subsequent records of *A. sericeus* in British literature refer to correctly identified material from the Channel Islands only (Day, 1979; 1988) and mainland Britain (Baldock, 2006).

Acknowledgements

Thanks are due to: Amoret Cooper, James Hogan and Darren Mann for access to the OUMNH insect collection; Ashleigh Whiffin for access to the insect collection of the National Museum of Scotland; Steve Brooks (NHMUK) for information on British climate; Lorna Mitchell, Royal Botanic Garden Edinburgh, and Geoff Hancock, Hunterian Museum, University of Glasgow, for discussion of the biography of William Little.

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SHORT COMMUNICATION

Minute bugs (Hemiptera: Microphysidae) in association with evergreens and conifers. – I had had little luck in finding these tiny bugs, until I took to suction sampling moss. With this method, I readily obtained all three inland species of the black forms (subgenus *Myrmedobia* Baerensprung), *Loricula exilis* (Fallén), *Loricula coleoptrata* (Fallén) and *Loricula distinguenda* (Reuter) (Ryan, 2013, 2014a & 2014b). However, the supposedly common species of subgenus *Loricula* Curtis, *Loricula pselaphiformis* Curtis and *Loricula elegantula* (Baerensprung), were seldom taken. A single male *L. elegantula* was reared from a nymph sucked from moss under trees at Homefield Wood, Medmenham, Buckinghamshire (SU810867) on 7 June 2013, and a female *L. pselaphiformis* was sucked from moss under trees at Warburg Reserve, near Henley, Oxfordshire (SU716880) on 28 June 2010. The employment of tree brushing (Kirby, 1984) delivered two specimens of the female *L. elegantula* at Sugarswell Business Park, Shennington, Oxfordshire (SP358439) on 21 July 2012. Sweeping a derelict field near Hitchcopse Pit, Dry Sandford, Watsonian Berkshire (SU454996) on 6 June 2008 produced a single male *L. pselaphiformis*. These were my only encounters with subgenus *Loricula*. Clearly, I was doing something wrong.

This problem has recently been solved, inadvertently, by attempting to improve my collecting of *Buchananiella continua* (F. B. White) (Anthocoridae). I decided to pay greater attention to the debris that comes from beating evergreens and conifers. After the usual examination in the sweep net, the debris was placed in plastic boxes for more thorough scrutiny at home under the microscope. Although I did find four specimens of the desired insect by this method, it was my regular encounter with minute bugs that was more worthy of note. Both *L. elegantula* and *L. pselaphiformis* were taken frequently, in particular among debris from larch.