

THE WATER-DROPWORT MINING BEE, *ANDRENA AMPLA* WARNCKE (HYMENOPTERA: APIDAE), NEW TO BRITAIN

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ABSTRACT

The traditional concept of *Andrena proxima* (Kirby) in Britain is shown to comprise two species, the true *A. proxima* with a distribution biased towards south-east and central England and *A. ampla* Warncke with a distribution biased towards south-west England, where it exhibits a strong association with Hemlock Water-dropwort *Oenanthe crocata*. The separation of the two species using morphology and DNA barcode sequences is described. The Water-dropwort Mining Bee *Andrena ampla* Warncke is added to the British list.

INTRODUCTION

The form of *Andrena proxima* known to R. C. L. Perkins, M. S. Spooner and other bee recorders who collected bees in Devon and Cornwall, and which forms a high proportion of the material at the Natural History Museum (NHMUK) and Oxford Museum of Natural History (OUMNH), is a fairly distinctive mining bee, with a noticeably elongate build, shiny metasoma and four rather conspicuous rectangular white spots on the tergites. When one of us (SJF) started to encounter *A. proxima* in south-east England and the Midlands, it was apparent that these lacked some of the distinctiveness of south-western material, being shorter in build and less shining. During preparation of the *Field Guide to the Bees of Great Britain and Ireland* (Falk, 2015), SJF examined his material in more detail and noticed other consistent differences between the duller, shorter bodied specimens from south-east and central England and the shinier, longer-bodied specimens from south-west England, particularly in relation to the microsculpture of the scutum and apical depressions of the tergites. The two forms are mentioned on page 151 of the Field Guide with the comment that the taxonomic status of the two forms requires further investigation.

METHODS

During 2016 SJF and PS were able to obtain fresh material of both forms from Kent and Cornwall, respectively. Some of the specimens were placed in 90% ethanol and sent to RP for DNA sequencing so that the DNA of the two forms could be compared and placed in context with other closely related species. Other specimens from the same visits were pinned to allow detailed morphological appraisal of DNA-tested populations.

DNA was extracted using a high salt protocol (Paxton *et al.*, 1996) from eight bees collected by SJF in Kent on 7–9.v.2016 and from five bees collected by PS in Cornwall/Devon on 22.v–7.vi.2017; material from both localities comprised a mix of

Table 1. List of DNA sequenced specimens, their repository and Accession Numbers of the COI (DNA barcode) sequences.

Label	Visual det.	Species	Sex	Location, OS Grid Ref and date sampled	Sample repository	BOLD Acc. No.
PS_1	PS	<i>Andrena ampla</i>	♂	Towan, Cornwall, SW8732, 22.v.2017	SJF	SBFEE001-19
PS_2	PS	<i>Andrena ampla</i>	♂	St. Loy, Cornwall, SW4223, 31.v.2017	SJF	SBFEE002-19
PS_3	PS	<i>Andrena ampla</i>	♂	Seaton, Cornwall, SX3054, 2.vi.2017	SJF	SBFEE003-19
PS_4	PS	<i>Andrena ampla</i>	♂	Shallow Pool, Cornwall, SX2355, 7.vi.1207	destroyed	SBFEE004-19
PS_5	PS	<i>Andrena ampla</i>	♀	Shallow Pool, Cornwall, SX2355, 7.vi.2017	SJF	SBFEE005-19
SF_1-1	SJF	<i>Andrena proxima</i>	♀	Grain Coastal Park, Kent, TQ8876, 7.v.2016	SJF	SBFEE006-19
SF_1-2	SJF	<i>Andrena proxima</i>	♂	Grain Coastal Park, Kent, TQ8876, 7.v.2016	SJF	SBFEE007-19
SF_1-3	SJF	<i>Andrena proxima</i>	♂	Grain Coastal Park, Kent, TQ8876, 7.v.2016	SJF	SBFEE008-19
SF_4-1	SJF	<i>Andrena proxima</i>	♀	Foreness Point, Kent, TR3871, 9.v.2016	destroyed	SBFEE009-19
SF_4-2	SJF	<i>Andrena proxima</i>	♀	Foreness Point, Kent, TR3871, 9.v.2016	destroyed	SBFEE010-19
SF_4-3	SJF	<i>Andrena proxima</i>	♂	Foreness Point, Kent, TR3871, 9.v.2016	SJF	SBFEE011-19
SF_4-4	SJF	<i>Andrena proxima</i>	♀	Foreness Point, Kent, TR3871, 9.v.2016	SJF	SBFEE012-19
SF_4-5	SJF	<i>Andrena proxima</i>	♂	Foreness Point, Kent, TR3871, 9.v.2016	SJF	SBFEE013-19

Visual ID: visual identification by: PS, Paddy Saunders; SJF, Steven Falk

Sample repository: destroyed, ground up during DNA extraction; SJF, private collection of Steven J. Falk

males and females. DNA was sequenced at the mitochondrial *cytochrome oxidase I* gene, the so-called universal animal ‘barcode’ region, using standard protocols recommended by BOLD (<http://www.barcodinglife.org>) and the ‘standard’ oligonucleotide PCR primers LCO/HCO (Folmer *et al.*, 1994). DNA sequences were used to interrogate the BOLD database using BOLD’s search function and NCBI’s database using BLAST (<https://blast.ncbi.nlm.nih.gov/Blast.cgi>).

SJF examined the British material identified as *A. proxima* at the NHMUK and OUMNH, segregating the two forms using the morphological characters listed below and extracted data. Records were also gathered from other active British bee recorders who were asked to check the specimens they had identified as *A. proxima* using the characters listed below and through reference to SJF’s Flickr site (*Andrena* collection) which furnishes high resolution images of the two forms: <https://www.flickr.com/photos/63075200@N07/collections/72157634554216556/>. All the records have been presented as a map in Fig. 10 which was created using QGIS 2.18.28. Map coordinates were either from the grid references that accompanied records or grid references selected for the hectad that best coincided with the location cited for a record without a grid reference.

RESULTS

DNA analysis

Results of the DNA analysis were generated in 2017. Sequences were of high quality, did not contain stop codons and showed the highest (>99%) similarity to *A. ampla* (the five bees from SW England) or to *A. proxima* (the eight bees from SE England). Variation in DNA sequence within each taxon was minimal (<0.2%) whereas there was a clear 'barcoding gap' (1.2–1.3% DNA sequence divergence) between the two taxa. A phylogenetic tree of the DNA sequences, generated using MEGA (Kumar, Stecher & Tamura, 2017) and incorporating additional published sequences for both taxa and closely related species that has also been keyed to species using morphology (Schmidt *et al.*, 2015), shows clearly that the SW England material represents *A. ampla* and the SE England material represents *A. proxima* (Fig. 1).

Morphology

Detailed examination of material previously identified as *A. proxima* at NHMUK, OUMNH and within SJF's personal collection confirmed that two forms with consistent morphological differences were present and that the two forms appear to show a strong geographical segregation. The key to Western and Central Palaearctic member of the subgenus *Proxiandrena* of Schmid-Egger (2005) supported the view gained from DNA analysis that *A. ampla* and *A. proxima* were the two species involved. A named *A. ampla* female (det. Warncke) from riverside flowers at Timouline, Morocco at the NHMUK was closely examined and corresponded well with the south-western form. The NHMUK also houses the Kirby (1802) types for *Andrena proxima*, and *A. digitalis* taken in Suffolk. These are both *A. proxima* and correspond with the south-eastern and central England form. All the data from these museums is incorporated below. *A. ampla* is not previously recorded as such from Britain (Else, Bolton & Broad, 2016; Else & Edwards, 2018) and we formally add it to the British list here.

Distinguishing Andrena ampla from A. proxima

Both species will key out as '*proxima*' using Falk (2015) and Else & Edwards (2018). Distinctions between the two are rather subtle and best achieved with reliably-named comparative material to hand. Females are easier to separate than males. The differences are summarised here:

Female A. ampla

Size and shape: larger, typical body length 10 mm, wing length 8.5 mm; more elongate and 'waisted' in shape (Fig. 2).

Head: when viewed in strictly dorsal view (in line with the longitudinal axis of the eyes) more deeply concave along hind margin so that the head appears more transverse and compressed in the middle; upper hind margin of the head forming a stronger crest where the top and hind faces meet; shiny patch adjacent to the top inner corner of each eye more extensive.

Mesosoma: in dorsal view more elongate with the propodeum less transverse; scutum shining without obvious microsculpture between the punctures (Fig. 4); scutum with a well pronounced pile of shorter black hairs beneath the main pile of long brown hairs.

Metasoma: more elongate in top view with all tergites longer in relation to their width and the sides of tergite 1 straighter and diverging more evenly towards the hind

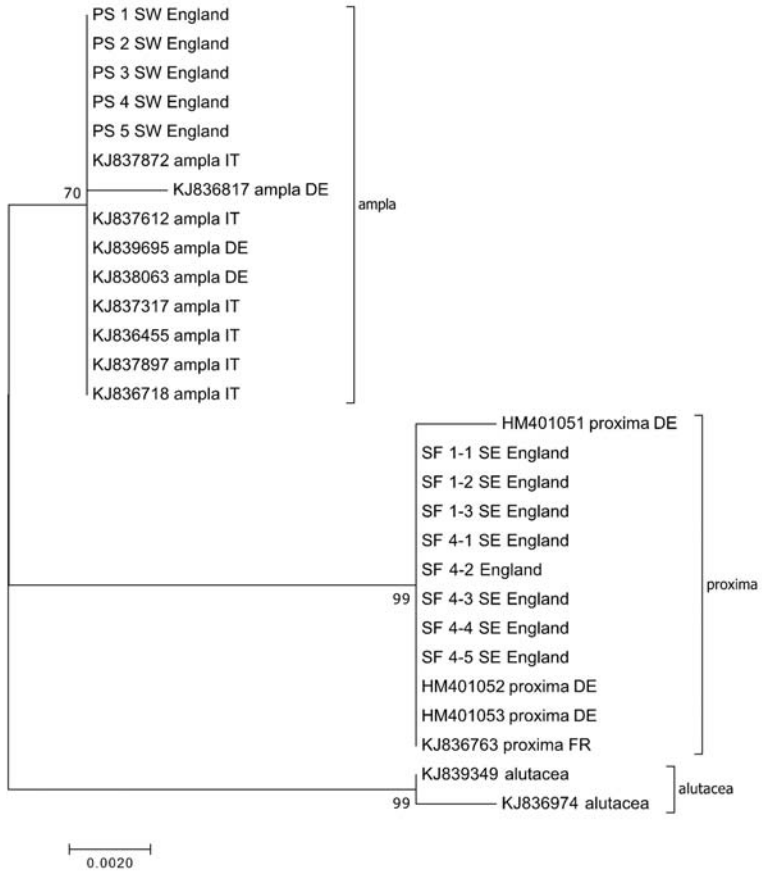


Fig. 1. Evolutionary relationships of *Andrena ampla*, *A. proxima* and the closely related non-British *A. alutacea* Stoeckert. Neighbour-joining tree using the Kimura 2-parameter model of the 579 aligned base pairs per taxon; the tree is drawn to scale, with branch lengths in the same units (number of base substitutions per site) as those of the evolutionary distances used to infer the phylogenetic tree. Sequences from Schmidt *et al.* (2015) have a unique two letter-six number NCBI code and species name. Sequences from SJF and PS commence with their initials (SJF/PS) and end with locality (SE England/SW England). They represent *A. proxima* (SE England) and *A. ampla* (SW England).

corners (Fig. 6); tergites shinier overall with the apical depression of tergites 2–4 shinier than the basal section of those tergites and with any microsculpture relatively weak; punctures of the basal section of tergites 2–4 stronger and those of tergite 3 fairly dense; lateral hair fringes along hind margins of tergites 2 and 3 denser and whiter (more conspicuous in the field); long hairs overlying tergite 5 usually dark grey.

Female *A. proxima*

Size and shape: Smaller, typical body length 9 mm, wing length 8 mm; build more compact (Fig. 3).



Fig. 2. Habitus of ♀ *Andrena ampla*.



Fig. 3. Habitus of ♀ *Andrena proxima*.

Head: When viewed as above, less deeply concave along hind margin so that the head appears more broadly rectangular; upper hind margin of the head not forming such a strong crest; shiny patch adjacent to the top inner corner of each eye less extensive.

Mesosoma: In dorsal view squarer with the propodeum more transverse; scutum usually with obvious microsculpture between the punctures (Fig. 5); scutum with only a few black hairs amongst the shorter hairs beneath the main pile of long brown hairs.

Metasoma: Less elongate in top view with all tergites wider in relation to their length and the sides of tergite 1 more curved (Fig. 7); tergites duller with the apical depression of tergites 2–4 bearing a transverse microsculpture that is as dense as that in the basal section of those tergites; punctures of tergites 2–4 small and inconspicuous, those of tergite 3 very sparse; lateral hair fringes along hind margins of tergites 2 and 3 sparser and yellowish (less conspicuous in the field); long hairs overlying tergite 5 yellowish-brown.

It should be noted that all the modern female specimens of *A. proxima* that SJF has collected from Kent (two locations) have a shinier scutum than other *proxima* material seen, including older Chitty and Guichard material from Kent. But in all other respects, they appear typical and the associated male material is fully typical of *proxima* with a very dull scutum.

Male *A. ampla*

Mesosoma: Scutum, at least centrally, shining with little if any microsculpture and with typical punctures that, whilst dense, are clearly separated from one-another and too small to contain any microsculpture within (Fig. 8).

Metasoma: Basal section of tergites 2–4 with relatively deeper, denser punctures.

Male *A. proxima*

Mesosoma: Scutum very dull with unusually large, shallow punctures that are abutting and often open on one side, giving the impression of a networks of ridges and crescents – the bottom of the punctures containing microsculpture (Fig. 9).



Fig. 4. Scutum of ♀ *Andrena ampla*.



Fig. 5. Scutum of ♀ *Andrena proxima*.



Fig. 6. Metasoma of ♀ *Andrena ampla*.

Fig. 7. Metasoma of ♀ *Andrena proxima*.

Metasoma: Basal section of tergites 2–4 with relatively weak, sparser punctures.

The key in Falk (2015) can be modified as follows:

Female (p. 101, couplet 6)

- 6 Head in front view much broader than high. Propodeum coarsely rugose throughout and without punctures. Scutum at least moderately shining with any microsculpture between punctures relatively weak. Pollen brush of hind legs and pile of propodeum and sides of thorax (mesosoma of this paper) whitish-haired. Build slimmer, with tergite 1 in dorsal view much less than twice as wide as long. Tergites often with a slight greyish bloom. 6a
- Head in front view only slightly broader than high. Propodeum with fine microsculpture plus distinct punctures at the sides. Scutum dulled by obvious microsculpture between the punctures. Pollen brush and pile of propodeum and sides of thorax buff-haired. Build broader, with tergite 1 at least twice as wide as long and the propodeum more transverse. 7
- 6a Scutum smooth and shining between the punctures (Fig. 4 of this paper) and with a well pronounced pile of black hairs beneath the main pile of brown hairs. Tergites 2-4 with apical depression shinier than the basal section and the punctures in the basal sections relatively strong. Larger (typical wing length 8.5 mm) and more elongate with tergite 1 in dorsal view with the sides straighter and diverging more evenly towards the hind corners (Fig. 6 of this paper) *ampla*
- Scutum with distinct microsculpture between the punctures (Fig. 4 of this paper) and only a few black hairs beneath the main pile of brown hairs. Tergites 2–4 with apical depression usually as dull as the basal section and the punctures in the basal section relatively weak. Smaller (typical wing length 8 mm) and stockier with tergite 1 in dorsal view with the sides more curved towards the hind corners (Fig. 6 of this paper). *proxima*

Male (p. 117, couplet 6)

- 6 Head in front view much broader than high. Apical depression of tergites 1–5 polished. Propodeum very coarsely rugose throughout. Scutum less dulled by microsculpture, semi-shining 6a
- Head in front view only slightly broader than high. Apical depression of tergites 1–5 dulled by microsculpture. Propodeum less coarsely rugose. Scutum much dulled by microsculpture, barely, if at all, shining 7
- 6a Scutum with dense but clearly separated, smaller punctures with only light microsculpture between (Fig. 8 of this paper) *ampla*
- Scutum with punctures larger and shallower, largely taking the form of abutting crescents and with microsculpture within them (Fig. 9 of this paper). *proxima*

Numerous high resolution images of both species alive and with pinned material displayed in more detail through the microscope can be obtained from SJF's online Flickr site (*Andrena* folder): <https://www.flickr.com/photos/63075200@N07/collections/72157634554216556/>

Confirmed records for Andrena ampla and A. proxima

Abbreviations: AT – A. Thornley; CHA – C. H. Andrews; FDM – F. D. Morice; GMS – G. M. Spooner; KMG – K. M. Guichard; NHMUK – Natural History Museum, London; OUMNH – Oxford University Museum; PH – P. Harwood; PS – Paddy Saunders; RCLP – R. C. L. Perkins; SJF – Steven J. Falk. All dets SJF or PS unless stated.

Andrena ampla

Cornwall: Caerhays Valley, 15 vi 1955 (1♀, GMS, NHMUK); Hannafore SX2552, 6 v 2012 (3♀, PS), 22 v 2011 (1♂, PS), 29 v 2012 (2♂, PS), Kennack Sands SW7316 2 vii 2004 coastal dunes (2♀, SJF); Lelant Towans, 25 vi 1929 (1♀, AT, NHMUK), 6 vi 1930 (1♀, AT, NHMUK); Pendower Beach SW897380, 1 vii 2004, stream running onto beach (1♀, SJF); Seaton Valley SX3055, 24 v 2011 (1♀, PS); St. Erth, 5 vi 1930 (2♀, AT, NHMUK); St. Loy SW4223, 5 vi 2016 (2♀, PS); Treen Cliff, 26 vii 1972 (1♀, GMS, NHMUK).

Devon: Bovey Heath, 10 vi 1955 (1♂, det GMS, OUMNH), 13 v 1961 (1♂, GMS, NHMUK); Bradley Woods, Newton Abbot, 16 v 1921 (1♂, RCLP 'on *Euphorbia*', OUMNH, 1♀, NHMUK); Branscombe 30 vi 1979 on *Oenanthe* (2♀, GMS, NHMUK); Brixham, 28 v 2016 (1♂, RCLP, OUMNH synoptic collection), 2 vi 1916 (4♀, RCLP, OUMNH, 1♀, NHMUK), 9 vi 1916 (8♀, 3♂, RCLP, OUMNH main & synoptic collections, 5♀ labels stating 'on umbell' and 1♀ label stating 'on *Euphorbia*'), 14 vi 1916 (2♀, 5♂, RCLP, OUMNH main & synoptic collections, 1m, RCLP, NHMUK), 2 vi 1925 (5f, NHMUK); Churston, 9 vi 1915 (4♀, 1♂, RCLP, OUMNH), 10 vi 1915 (4♀, RCLP, OUMNH), 9 vi 1917 (3♀, 2♂, RCLP, OUMNH main & synoptic collections); Dartmoor, 8 vi 1935 (1♀, RCLP, NHMUK); Dawlish, 27 v 1914 (1♂, RCLP, OUMNH); Hill Town Lane, Tavy, 30 v 1984 (1♂, GMS, NHMUK); Horndon area, Upper Tavy, 4 vii 1977 (1♀, GMS, SJF collection, 1♀, GMS, NHMUK); Newton Abbot, assorted dates between 1921 and 1940 (13♀, 1♂ RCLP, NHMUK); Slapton Ley SX819443, 28 v 1989 edge of marsh, a nesting area with *Nomada conjungens* Herrich-Schäffer in attendance (4♀, 3♂, SJF), 26 & 27 vi 2019 (numerous on *Oenanthe crocata* and basking on foliage nearby accompanied by numerous *N. conungens*); Tamerton, 3 vi 1974, on *Oenanthe* (2♀, 1♂, NHMUK), 27 v



Fig. 8. Scutum of ♂ *Andrena ampla*.

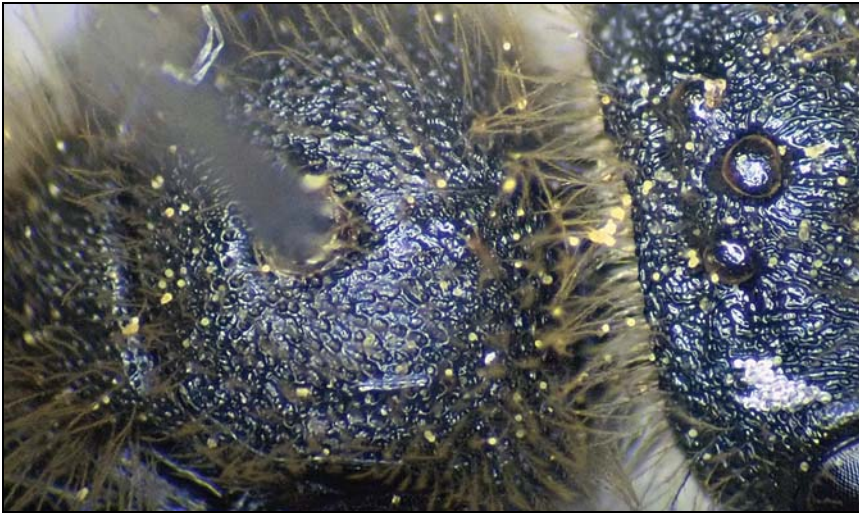


Fig. 9. Scutum of ♂ *Andrena proxima*

1975 on *Oenanthe* (2♀, NHMUK), 3 vi 1975 (1♂, GMS, NHMUK), 3 v 1977 (1♀, GMS, NHMUK); Willsworthy, 25 vi 1980 (1♂, GMS, NHMUK).

Caernarvon: Porth Neigwl SH290257, 19 vi 2019, 1♂ on *Oenanthe crocata* (coll. & det. L. Olds).

Dorset: Abbotsbury Beach SY557847, 7 vi 2011 (1♀, coll. & det A. Knowles); Bayleaze Cove, Weymouth, SY701819, 3 vi 2019 approx. dozen ♀ & 2 males at *Oenanthe crocata* (coll. & det. A. P. Foster); Powerstock Common, 18 vi 1929 (1♂, GMS, NHMUK); Swanage, 7 vi 1900 (1♀, FDM, NHMUK), vi 1907 (2♀,

Arnold collection, OUMNH, 10f, 1♂, Mortimer, NHMUK), vi 1908 (3♀, Nevinson, OUMNH, 3♀, 2♂ Mortimer, NHMUK), vi 1909 (1♀, Mortimer, NHMUK), 16 vi 1909 (3♀, Nevinson, OUMNH), 10 vi 1913 (8♀, Nevinson, OUMNH), no date (1♂, Nevinson, OUMNH); The Spittles, Lyme Regis, Dorset SY3459281, 12 vi 2018, 1♀ on *Oenanthe pimpinelloides* in a coastal field (coll. T. Raw, det. A. P. Foster).

Isle of Wight: Brook, 1 vi 1945 (3♀, CHA, NHMUK); Niton, 11 v 1945 (1♀, CHA, NHMUK), 17 v 1945 (1♂, CHA, NHMUK); Steephill Cove undercliff SZ5576, one male 26 v 1979, 1♂ 22 iv 1988 and 1♀ 24 vi 1984, coastal scrub-grassland, one record possibly from *Smyrniium* (coll. G. W. Else, det. M. Edwards).

Merioneth: Barmouth 26 vi 1902 (1♀, Yerbury, NHMUK), 5 vii 1902 (2♀, Yerbury, UK).

Somerset: Bossington, 22 vi 1981 (1♀, 1♂, GMS, NHMUK).

Andrena proxima

Berkshire: Aldworth, 12 vi 1904 (4♀, PH, NHMUK), 25 v, 1905 (1♀ PH, NHMUK), 3 vi 1906 (4♀, 5♂, PH, NHMUK).

Essex: Hadleigh Castle TQ80386, 14 v 2010, male(s) on *Anthriscus sylvestris* (coll. & det. M. Edwards); Davy Down TQ5980, 1♀ 28 v 2003 & 1♂ 17 v 2016 (coll. & det. A. Knowles).

Glamorgan: Duchy Quarry SS905757, 15 v 2018 (coll. & det. L. Olds).

Hampshire: Aldworth, 3 vi 2006 (1♀, P. Harwood, OUMNH); Sowley Marsh SZ379959, 21 v 2011 coastal marsh (clear photograph on *O. crocata* by SJF).

Kent: Aylesford TQ725594, 8 v 2000 (coll. & det. G. Allen); Blue Bell Hill, 10 vi 1900 (1♀, Elgar, NHMUK); Capstone TQ773635, 25 v 2018, both sexes on Apiaceae including *Oenanthe crocata* and *Anthriscus sylvestris* (coll. & det. M. Edwards); Charing, 11 vi 1904 (1♀, Chitty, OUMNH); Darenth Wood, 18 vi 1939 (5f, KMG, NHMUK); Foreness Point, Margate TR385714, 9 v 2016, cliff-top chalk grassland on *Smyrniium* (3♀, 4♂, SJF, several more specimens sent to RP for sequencing); Grain Coastal Park TQ889769, 7 v 2016, coastal grassland on *Smyrniium* (1♀, 4♂, SJF, several more specimens sent to RP); Halling, 4 vi 1900 (1♂, Elgar, NHMUK), 3 vi 1901 (4♂, Elgar, NHMUK), 8 vi 1901 (2♂, Elgar, NHMUK); Herne, 16 v 1936 (1♂, KMG, NHMUK); 'Huntingfield', Faversham, assorted dates 1900–1909, many dates illegible (7♀, 23♂, Chitty, OUMNH, 1♂, 30 v 1900, Chitty, NHMUK); 'Kent' (no location) 3 v 1901 (1♂, Elgar, NHMUK), 8 vi 1901 (2♀, 1♂, Elgar, NHMUK); Pluckley, 15 v 1966 (1♂, KMG, NHMUK), 29 v 1966 (1♀, KMG, NHMUK), 5 vi 1966 (1♀, KMG, NHMUK); Wratham Hills, 30 vi 1898 (1♂, Elgar); The Warren, Folkstone TR247372, 24 v 2001 (coll. & det. M. Edwards); Wrotham TQ629606 13 v 2000 (coll. & det. M. Edwards).

Oxon: Hartslock SSSI SU619790 7 vi 2015, 2♀ on *Chaerophyllum temulum* (coll. & det. D. G. Notton, NHMUK).

Norfolk: Arminghall TG242050, 11 vi 2018, 3♀ on *Heracleum sphondylium*, arable margin (coll. & det. T. Strudwick).

Suffolk: Barham, pre-1802 (2♀, W. Kirby, OUMNH, one being a syntype of *Melitta proxima* (specimen 17a2922), the other being a syntype of *Melitta digitalis* Kirby, 1802 (specimen 17a2933); Clare TL7645, 15 v 2011 (3♀, coll. & det. A. Knowles); Hornham Churchyard TM2172, 20 v 2016 (3♂, 2♀, coll. & det. A. Knowles); Kessingland Cliffs TM5388, 30 v 2006 (1♂, coll. & det. I. Wright), same location TM5387, 8 vi 2014, 1♀ on Hogweed, soft rock cliff (coll. & det. T. Strudwick); Mendham TM2682, 20 v 2016 (1♂, coll. & det. A. Knowles); Mickfield Churchyard TM1361, 4 v 2011 (1♂, 2♀, coll. & det. A. Knowles); Mickfield Playing Field TM1361, 23 v 2012 (2♀, coll. & det. A. Knowles); Monks Soham Churchyard

TM2165, 4 v 2011 (1♀, coll. & det. A. Knowles); Shimpling Park Farm TL8651, 18 vi 2018 (2♀) & 16 vii 2018 (1♂) (coll. & det. A. Knowles); Wetherden Churchyard TM0062, 21 v 208 (1♀, coll. & det. A. Knowles). It seems to completely avoid the Sandlings and Suffolk Brecks preferring heavier soils (A. Knowles – pers. comm.).

Surrey: Betchworth, Dorking SU191500, 2 vii 2000 (coll. & det. M. Edwards); Pewley Down, 30 vi 2006 (1♀, D. Baldock, OUMNH).

Sussex: Beachy Head TV597962, 23 v 2004 chalk downland on *Smyrniolum olusatrum* (1♀, SJF); Chichester SU867065, 25 vi 2012, female(s) on *Anthriscus sylvestris* (coll. & det. M. Edwards); Cuckmere Haven TV5197, 17 vi 2005, coastal levels (1♀, SJF); Darvel, near Robertsbridge, 27 v 1981 (1f, E. J. Phillips, NHMUK); Denton Downs TQ462031, 21 v 2008, chalk downland (2♀, SJF); Fairwarp, Ashdown Forest TQ473266, 16 v 2005, male(s) on Pignut *Conopodium majus* (coll. & det. M. Edwards); Frog Firlie TQ511011, 11 vi 2005 (1♀, SJF); Heyshott Escarpment SU899170, 11 v 2011, male(s) on *Anthriscus sylvestris* (coll. & det. M. Edwards); Lullington Heath TQ544016 11 vi 2006, chalk downland (1♀, SJF); Mayfield TQ617270, 4 vii 2016, female(s) on *Anthriscus sylvestris* (coll. & det. M. Edwards); Mount Caburn TQ444089 19 v 2008, chalk downland on *Anthriscus sylvestris* with *Nomada conjungens* recorded nearby (4♀, 1♂, SJF); Rickney Levels TQ6206, 16 vi 2005, coastal levels (1♀, SJF probably on *Oenanthe crocata*); West Dean Woods SU847157, 22 v 2018, male(s) on Cow Parsley (coll. & det. M. Edwards).

Warwickshire: Bishops Hill SP384587, 11 vi 2001, limestone quarry, females on *Aegopodium podagraria* plus males on *Bellis perennis* (7♀, 4♂, SJF); Napton Quarry SP455613, 7 vi 2005, ironstone quarry (1♀, SJF).

Locality unknown: 4♀, 2♂ (OUMNH, presented to Hope Coll. from Ent. Club in 1927, 2 of the females labelled as ‘*collinsonana* Kirby, 1802’); ‘Offord’ (county unclear) 6 v 1923 (1♂, PH, NHMUK).

DISCUSSION

The information to hand indicates both geographical and ecological differences between these two species (Fig 10). The distribution of *A. ampla* has a strong south-west bias with no confirmed records known east of the Isle of Wight and it seems to forage primarily from *O. crocata*. Most of its records are from coastal areas where large stands of the forage plant plus suitable nesting locations (usually well-drained south-facing slopes in sunny locations with short or sparse vegetation) occur in relatively warm and sheltered settings. Such habitat is by no means rare in Devon and Cornwall, and the bee is still widespread here even if very local. It appears to be long-established in the south-west and was well-known to Perkins and Spooner, and with Victorian locations (Sidmouth and Land’s End) alluded to by Saunders (1896). There is little indication of any significant increase or decline in *A. ampla* within this core range. Further records from Caernarvon and Merioneth (modern Gwynedd) suggest Wales could also be important for *A. ampla* and a possible photograph of a female foraging on *Oenanthe crocata* in 2019 at Newport Wetlands, Glamorgan (modern Gwent) was sent to SJF. All the records for ‘*proxima*’ in Devon and Cornwall, many of which were collated by G.M. Spooner as unpublished lists in about the late 1980s, are likely to refer to *ampla*, and the association with *Oenanthe* is very evident in these lists. The seeming inability to use *Oenanthe crocata* stands away from the south-west or Welsh coastal areas may result from a need for a more maritime climate with higher rainfall and lower mean summer temperature.

Andrena proxima by contrast is predominantly a species of south-east England east of Dorset, plus central England and one recent record from Glamorgan. It seems to

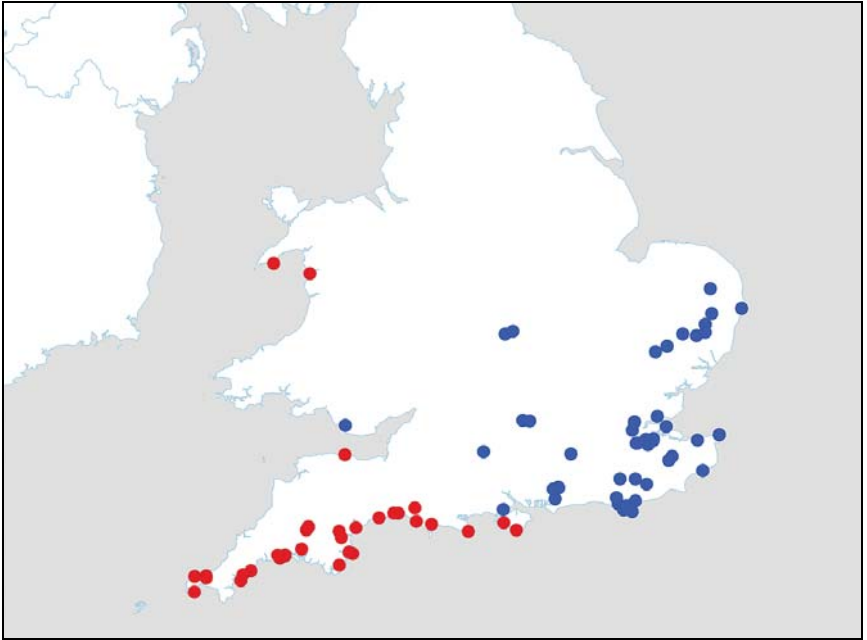


Fig. 10. Map showing confirmed British records of *Andrena ampla* (red dots) and *A. proxima* (blue dots) showing the largely allopatric nature of their British distributions.

use a variety of Apiaceae for foraging and whilst this can include *O. crocata* (the Sowley Marsh record cited below and possibly the Rickney Levels record), there is no special attachment to this plant and it will forage upon flowers of *Anthriscus sylvestris*, *Aegopodium podagraria*, *Chaerophyllum temulum*, *Heracleum sphondylium* and *Smyrniolum olusatrum*. It seems to forage primarily on *Smyrniolum* at some Kent sites, probably because this plant is locally so abundant rather than because of any particular preference for this plant over other umbellifers (Apiaceae). In the Midlands there is a loose association with brownfield sites on calcareous soils such as old limestone quarries. In East Anglia it has been recorded from arable landscapes and churchyards. There is a strong indication that it is one of the many British bee species currently expanding north and it seems to have increased in East Anglia too over recent years. It was considered very rare by Saunders (1896) who gives only a handful of locations for *A. proxima* in the broad sense. The type location for *A. proxima* is Barham, Suffolk (Kirby, 1802) and this is also the case for *A. digitalis* (Kirby, 1802) which is a synonym of *A. proxima*.

Abroad, *A. ampla* is known from various parts of the Alps, the Iberian Peninsula, and Central Asia (Schmid-Egger, 2005) plus North Africa (NHMUK). Previously it had been considered largely confined to the Iberian Peninsula (Gusenleitner & Schwarz, 2002). *Andrena proxima* is known from much of Europe except the Iberian Peninsula but is apparently missing in the central and western Alpine valleys. From a conservation aspect *A. proxima* is graded Data Deficient in the European Red List of

Bees (Nieto *et. al.*, 2014) but *A. ampla* is not listed at all, probably because it has been regarded as a subspecies of *A. proxima* by some workers until quite recently. *A. proxima* in the broad sense was assessed as RDB3 (Nationally Rare) in Falk (1991). Today, both species would probably qualify as Nationally Scarce without any IUCN threat grade.

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