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Front cover: *Andrena batava* Pérez, 1902, male lectotype. © Thomas J. Wood.

The genus *Andrena* in Belgium: revisions, clarifications, and a key for their identification (Hymenoptera: Andrenidae)

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Abstract

As an early-industrialising northern European country, Belgium has a comparatively well-studied insect fauna. Despite this, many challenging insect groups have lacked domestic specialists, and so work is required to resolve outstanding issues for the Belgian fauna. The species-rich genus *Andrena* is no exception, being the largest bee genus in Belgium and more broadly the West Palearctic, and amongst its most taxonomically challenging. A critical review of the literature and examination of museum and contemporary collections has produced a list of 81 confirmed *Andrena* species for Belgium, with a further five species that cannot be positively confirmed as present historically. Nineteen species reported from or suggested as possibly present in Belgium are definitively excluded. The controversial taxon *Andrena batava* Pérez, 1902 is confirmed as present in Belgium along with *Andrena apicata* Smith, 1847, and its status is clarified through support from genetic and morphological evidence combined with a lectotype designation. A lectotype is also designated for *Andrena mitis* Schmiedeknecht, 1883. The controversial specific status of *Andrena nigrospina* Thomson, 1872 is supported by fresh genetic analysis as distinct from *Andrena pilipes* Fabricius, 1781, which is also confirmed as present in Belgium. Two members of the *Andrena ovatula* (Kirby, 1802) species complex are present in sympatry: *A. ovatula* and *Andrena afzeliella* (Kirby, 1802). An identification key to the genus is presented. These results illustrate the extent to which our understanding of this complex bee genus is incomplete, even in nominally better studied northern European countries.

Keywords: solitary bees, taxonomy, cryptic species, DNA barcoding

Introduction

Belgium is a small and densely populated country in north-western Europe. Though it has produced a disproportionate number of bee taxonomists and researchers for its size (see Drossart *et al*., 2019), Belgium has had only limited domestic expertise for the enormous bee genus *Andrena* that comprises around 450 species in Europe and more than 1,650 species globally (Gusenleitner & Schwarz, 2002; Rasmont *et al*., 2017; Wood & Monfared, 2022; TJW, *unpublished data*). As a result of this shortage of specialist workers (though see Patiny 1997; 1998), there has been confusion over the size of the Belgian *Andrena* fauna, in addition to broader confusion at a European level given ongoing nomenclatural problems (e.g. Wood *et al*., 2022), undescribed species (e.g. Wood, 2021), and the difficulty of recognising and distinguishing cryptic or oversplit taxa, with some of these problems having only been resolved recently (e.g. Reemer *et al*., 2008; Schwenninger, 2009; Gueuning *et al*., 2020; Praz *et al*., 2019; 2022).

Several lists of *Andrena* species present in Belgium have been compiled. However, different and sometimes obscure methodologies have been used, and as a result the faunal lists differ, sometimes meaningfully. The first work, Leclercq (1972), lists 77 species for the country.

Table 1. Summary of previous works that have listed Belgian *Andrena* species. For clarity, species are listed by their currently accepted names; where they were cited under different names, this is specified in each case.

Species	**Leclercq (1972)**	**Pauly (1999)**	**Patiny & Terzo, (2010)**	**Drossart *et al*. (2019)**
Andrena agilissima (Scopoli, 1770)	Yes	Yes	Yes	Yes
Andrena alfkenella Perkins, 1914		Yes	Yes	Yes
Andrena angustior (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena anthrisci Blüthgen, 1925	Yes	Yes	Yes	Yes
Andrena apicata Smith, 1847	Yes	Yes	Yes	Yes
Andrena argentata Smith, 1844	Yes	Yes	Yes	Yes
Andrena assimilis Radoszkowski, 1876			??? (as *A. gallica* Schmiedeknecht, 1883)	Yes
Andrena barbareae Panzer, 1805		Yes	Yes	Yes
Andrena barbilabris (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena batava Pérez, 1902		Yes		
Andrena bicolor Fabricius, 1775	Yes	Yes	Yes	Yes
Andrena bimaculata (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena bucephala Stephens, 1846			Yes	
Andrena chrysopus Pérez, 1902				Yes
Andrena chrysopyga Schenck, 1853	Yes	Yes	Yes	Yes
Andrena chrysosceles (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena cineraria (Linnaeus, 1758)	Yes	Yes	Yes	Yes
Andrena cinerea Brullé, 1832				Yes
Andrena clarkella (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena coitana (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena combinata (Christ, 1791)	Yes	Yes	Yes	Yes
Andrena confinis Stöckhert, 1930			??? (as *A. congruens* Schmiedeknecht, 1884)	
Andrena curvungula Thomson, 1870	Yes	Yes	Yes	Yes
Andrena decipiens Schenck, 1861		Yes	Yes	Yes
Andrena denticulata (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena distinguenda Schenck, 1871	Yes (as *A. obsoleta* Pérez, 1895)	Yes	Yes	Yes
Andrena dorsata (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena falsifica Perkins, 1915	Yes	Yes	Yes	Yes
Andrena ferox Smith, 1847	Yes	Yes	Yes	Yes
Andrena flavipes Panzer, 1799	Yes	Yes	Yes	Yes
Andrena florea Fabricius, 1793	Yes	Yes	Yes	Yes
Andrena floricola Eversmann, 1852	Yes	Yes	Yes	Yes
Andrena fucata Smith, 1847	Yes	Yes	Yes	Yes
Andrena fulva (Müller, 1766)	Yes	Yes	Yes	Yes
Andrena fulvago (Christ, 1791)	Yes	Yes	Yes	Yes
Andrena fulvata Stöckhert, 1930				Yes
Andrena fulvida Schenck, 1853	Yes	Yes	Yes	Yes
Andrena fuscipes (Kirby, 1802)	Yes	Yes	Yes	Yes

Species	Leclercq (1972)	Pauly (1999)	Patiny & Terzo, (2010)	Drossart *et al*. (2019)
Andrena gelriae van der Vecht, 1927	Yes	Yes	Yes	Yes
Andrena granulosa Pérez, 1902			???	
Andrena gravida Imhoff, 1832	Yes	Yes	Yes	Yes
Andrena haemorrhoa (Fabricius, 1781)	Yes	Yes	Yes	Yes
Andrena hattorfiana (Fabricius, 1775)	Yes	Yes	Yes	Yes
Andrena helvola (Linnaeus, 1758)	Yes	Yes	Yes	Yes
Andrena humilis Imhoff, 1832	Yes	Yes	Yes	Yes
Andrena intermedia Thomson, 1870	Yes	Yes	Yes	Yes
Andrena labialis (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena labiata Fabricius, 1781	Yes	Yes	Yes	Yes
Andrena lagopus Latreille, 1809			???	
Andrena lapponica Zetterstedt, 1838	Yes	Yes	Yes	Yes
Andrena lathyri Alfken, 1899	Yes	Yes	Yes	Yes
Andrena lepida Schenck, 1861			???	
Andrena limata Smith, 1853	Yes	Yes	Yes	Yes
Andrena marginata Fabricius, 1776	Yes	Yes	Yes	Yes
Andrena minutula (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena minutuloides Perkins, 1914	Yes	Yes	Yes	Yes
Andrena mitis Schmiedeknecht, 1883	Yes	Yes	Yes	Yes
Andrena morio Brullé, 1832			???	
Andrena nana (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena nanula Nylander, 1848		Yes	Yes	Yes
Andrena nasuta Giraud, 1863			???	
Andrena nigriceps (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena nigroaenea (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena nigrospina Thomson, 1872			Yes	Yes
Andrena nitida (Müller, 1776)	Yes	Yes	Yes	Yes
Andrena nitidiuscula Schenck, 1853	Yes	Yes	Yes	Yes
Andrena nitidula Pérez, 1903			Yes	Yes
Andrena niveata Friese, 1887	Yes	Yes	Yes	Yes
Andrena nuptialis Pérez, 1903			Yes	
Andrena nycthemera Imhoff, 1866	Yes	Yes	Yes	Yes
Andrena ovatula (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena pallitarsis Pérez, 1903			???	
Andrena pandellei Pérez, 1895	Yes	Yes	Yes	Yes
Andrena pilipes Fabricius, 1781	Yes (as *A. carbonaria* L., 1767)	Yes	Yes	Yes
Andrena polita Smith, 1847	Yes	Yes	Yes	Yes
Andrena potentillae Panzer, 1809	Yes	Yes	Yes	Yes
Andrena praecox (Scopoli, 1763)	Yes	Yes	Yes	Yes
Andrena propinqua Schenck, 1853	Yes	Yes		Yes
Andrena proxima (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena pusilla Pérez, 1903	Yes	Yes	Yes	Yes

Species	Leclercq (1972)	Pauly (1999)	Patiny & Terzo, (2010)	Drossart *et al.* (2019)
Andrena rosae Panzer, 1801	Yes	Yes	Yes	Yes
Andrena ruficrus Nylander, 1848	Yes	Yes	Yes	Yes
Andrena russula Lepeletier, 1841	Yes (as *A. ocreata* Christ, 1791)	Yes (as *A. similis* Smith, 1849)	Yes (as *A. similis* Smith, 1849)	Yes (as *A. similis* Smith, 1849)
Andrena schencki Morawitz, 1866	Yes	Yes	Yes	Yes
Andrena scotica Perkins, 1916	Yes (as *A. sabulosa* Scopoli, 1763)	Yes (as *A. jacobi* Perkins, 1921)	Yes (as *A. carantonica* Pérez, 1902)	Yes (as *A. carantonica* Pérez, 1902)
Andrena semilaevis Pérez, 1903	Yes (as *A. saundersella* Perkins, 1914)	Yes	Yes	Yes
Andrena simillima bremensis Alfken, 1900		Yes	Yes	
Andrena spreta Pérez, 1895				Yes
Andrena stragulata Illiger, 1806			Yes	
Andrena strohmella Stöckhert, 1928	Yes	Yes	Yes	Yes
Andrena subopaca Nylander, 1848	Yes	Yes	Yes	Yes
Andrena suerinensis Friese, 1884			???	
Andrena synadelpha Perkins, 1914	Yes	Yes	Yes	Yes
Andrena tarsata Nylander, 1848	Yes	Yes	Yes	Yes
Andrena thoracica (Fabricius, 1785)	Yes	Yes	Yes	Yes
Andrena tibialis (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena trimmerana (Kirby, 1802)		Yes	Yes	Yes
Andrena vaga Panzer, 1799	Yes	Yes	Yes	Yes
Andrena varians (Kirby, 1802)	Yes	Yes	Yes	Yes
Andrena ventralis Imhoff, 1832	Yes	Yes	Yes	Yes
Andrena viridescens Viereck, 1916	Yes	Yes	Yes	Yes
Andrena wilkella (Kirby, 1802)	Yes	Yes	Yes	Yes
Total	**77**	**84**	**87-96**	**89**

In subsequent works, Pauly (1999) listed 84 species for Belgium, Patiny & Terzo (2010) in a revision of Belgium and the north of France listed 87-96 species (nine species are marked with a '?'), and Drossart *et al*. (2019) listed 89 species, giving a total of 102 species that have been at least possibly mentioned from Belgium in the last 50 years (Table 1). Clearly, there is a lack of consensus surrounding which taxa are truly part of the Belgian fauna, as well as taxonomic confusion, as some of the names used by these authors disagree with each other, as well as other European authors (e.g. Schmid-Egger & Scheuchl, 1997; Amiet *et al*., 2010), to say nothing of the changes to species concepts following ongoing taxonomic revisions (Praz *et al*., 2022; Wood *et al*., 2022; Wood & Monfared, 2022).

The purpose of this work is therefore to comprehensively revise the Belgian *Andrena* fauna through a critical review of the literature and examination of museum and contemporary specimens in light of recent taxonomic developments. An identification key is also provided to bring workers up to date with changes in concepts and their application in a Belgian context, and to aid their current and future work.

Material and methods

The two major bee collections in Belgium were visited, namely the Royal Belgian Institute of Natural Sciences (RBINS) in Brussels, and the Conservatoire entomologique de Gembloux (CEGX) in Gembloux. Data collection was completed in September 2022. A large part of this historical material was identified by various workers, including A. Crèvecoeur, A. Remacle, P. Maréchal, J. Leclercq, S. Patiny, and K. Warncke (see Pauly, 2001). Unless stated, all specimens were identified or had their identities confirmed by the author. This work was part of a revision of West Palearctic *Andrena* that involves visits to important European museum collections. Ultimately, 1,806 female and 1,093 male *Andrena* specimens collected in Belgium were examined.

A contemporary advantage unavailable to previous workers is the use of molecular techniques. In order to clarify the status and presence of certain taxa in Belgium, genetic barcodes were generated from Belgian specimens along with material from other parts of Europe to ensure consistency at a European scale. For genetic barcoding, a single midleg was removed from pinned specimens and sent to the Canadian Center for DNA barcoding (CCDB) in Guelph, Canada for DNA extraction and sequencing. Specimens were sequences following standardised high-throughput protocols (Ivanova *et al.*, 2006) using Lep1 primers to amplify the 658 bp target region of the cytochrome *c* oxidase I (*COI*) gene. Specimens that were successfully barcoded and whose sequences are presented here are listed in Table 2. Phylogenetic trees were enriched with published barcodes (Genbank or BOLD) from other studies on the European *Andrena* fauna (e.g. Schmidt *et al*., 2015). Sequences were aligned using SeaView (Gouy *et al.*, 2010) and a neighbour-joining phylogeny was run with 10,000 bootstraps. Intra- and interspecific distances were calculated using MEGA-X (Kumar *et al.*, 2018).

Subgeneric concepts follow Pisanty *et al*. (2022). The following abbreviations are used in the text: A = antennal segments, S = metasomal sterna, and T = metasomal terga.

Abbreviations

CEGX = Conservatoire entomologique de Gembloux, Gembloux Agro-Bio Tech, Gembloux, Belgium

CEN-NPC = Le Conservatoire d'espaces naturels du Nord-Pas-de-Calais, Dury, France

MNHN = Muséum national d'Histoire naturelle, Paris, France

NMINH = National Museum of Ireland, Natural History, Dublin, Ireland

OÖLM = Oberösterreiches Landesmusum, Linz, Austria

RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium

RMNH = Naturalist Biodiversity Center, Leiden, the Netherlands

SMFD = Naturmuseum Senckenberg, Frankfurt, Germany

TJWC = Thomas J. Wood personal collection, Mons, Belgium

UMONS = Laboratory of Zoology collection, University of Mons, Mons, Belgium

ZMHB = Museum für Naturkunde, Berlin, Germany

Table 2. The scientific names of specimens sampled for genetic analysis with their collection localities and voucher depositories. Specimens are labelled with a yellow label which carries the voucher code. All data are available on BOLD.

Taxon	Locality	Depository	Collector / Identifier	Voucher code	BOLD
Andrena batava Pérez, 1902	Belgium: Antwerp, Balen	TJWC	W. Vertommen / T. Wood	TJW_198	WPATW102-21
Andrena aff *bimaculata* (Kirby, 1802)	Belgium: Machelen	TJWC	W. Vertommen / T. Wood	TJW_195	WPATW099-21
Andrena bimaculata (Kirby, 1802)	Spain: Navalsauz	TJWC	T. Wood / T. Wood	TJW_275	WPATW170-21
Andrena bimaculata (Kirby, 1802)	Spain: Navalsauz	TJWC	T. Wood / T. Wood	TJW_273	WPATW168-21
Andrena bimaculata (Kirby, 1802)	Spain: Navalperal de Tormes	TJWC	T. Wood / T. Wood	TJW_502	WPATW334-21
Andrena bimaculata (Kirby, 1802)	Spain: Sierra Nevada	TJWC	T. Wood / T. Wood	TJW_412	WPATW270-21
Andrena bimaculata (Kirby, 1802)	Spain: Grazalema	TJWC	T. Wood / T. Wood	TJW_344	WPATW219-21
Andrena bimaculata (Kirby, 1802)	Spain: Sierra de las Nieves	TJWC	T. Wood / T. Wood	TJW_367	WPATW240-21
Andrena bimaculata oligotricha Mavromoustakis, 1952	Cyprus: Limassol	TJWC	A. Varnava / T. Wood	TJW_093	WPATW038-21
Andrena fuscosa Erichson, 1835	Portugal: Sapiãos	TJWC	T. Wood / T. Wood	TJW_132	WPATW058-21
Andrena fuscosa Erichson, 1835	Spain: Cabo de Gato	TJWC	T. Wood / T. Wood	TJW_437	WPATW286-21
Andrena fuscosa Erichson, 1835	Spain: Lleida, Corbins	TJWC	T. Wood / T. Wood	TJW_131	WPATW057-21
Andrena lapponica Zetterstedt, 1838	Belgium: Averbode	TJWC	T. Wood / T. Wood	TJW_185	WPATW091-21
Andrena mitis Schmiedeknecht, 1883	Belgium: Orveytbos Moen	TJWC	T. Wood / T. Wood	TJW_041	WPATW006-21
Andrena nigrospina Thomson, 1872	Spain: Bustares	TJWC	T. Wood / T. Wood	TJW_496	WPATW329-21
Andrena nigrospina Thomson, 1872	Spain: Pajaroncillo	TJWC	T. Wood / T. Wood	TJW_473	WPATW310-21
Andrena pilipes Fabricius, 1781	France: Fontenilles	TJWC	T. Wood / T. Wood	TJW_537	WPATW362-21
Andrena pilipes Fabricius, 1781	Belgium: De Panne	TJWC	Y. Gevaert / T. Wood	TJW_533	WPATW358-21
Andrena pilipes Fabricius, 1781	Spain: Sevogia, Madrona	TJWC	T. Wood / T. Wood	TJW_261	WPATW158-21
Andrena pilipes Fabricius, 1781	Spain: Seville, Aznalcazar	TJWC	T. Wood / T. Wood	TJW_309	WPATW195-21
Andrena relata Warncke, 1975	Spain: Sevogia, Madrona	TJWC	T. Wood / T. Wood	TJW_522	WPATW348-21
Andrena suerinensis Friese, 1884	Spain: Madrid, Seseña Nuevo	TJWC	T. Wood / T. Wood	TJW_247	WPATW146-21
Andrena tibialis (Kirby, 1802)	Belgium: Dendermonde	TJWC	J. D’Haeseleer / T. Wood	TJW_199	WPATW103-21

Results

Species status of controversial taxa

Andrena (*Andrena*) *batava* Pérez, 1902

The status of this taxon has been controversial. The taxon was described from the Netherlands, with Pérez (1902) writing: *"Reçue de Holland, la ♀ sous le nom de* Lapponica*, le ♂ comme variété du* praecox*"*. Warncke (1967) wrote that he examined much material from Stöckhert that fell between *A. batava* and *A. apicata* Smith, 1847, hence he considered *A. batava* to be the same broad species as *A. apicata*. This was the position adopted by Gusenleitner & Schwarz (2002) who listed *A. batava* as a synonym of *A. apicata*, as did Amiet *et al*. (2010). However, Schmid-Egger & Scheuchl (1997) used a two taxon approach, separating *A. batava* and *A. apicata*. They provided criteria for their identification, predominantly based on the relative length of the basal mandibular tooth in both the male and female sexes, being longer in *A. apicata* (Fig. 1) and shorter in *A. batava* (Fig. 2). Though noting that the exact distributions were unclear, they state that *A. apicata* appears to be a more southerly taxon, and *A. batava* a more northerly taxon, following Stöckhert (1930) who said that *A. batava* was widespread in northern parts of central Europe.

To solve this puzzle, it is important to consider the situation in the British Isles. Smith (1847) described *A. apicata* from the United Kingdom, though he did not specify a type locality. Subsequently, the name *A. apicata* has thus been exclusively used for the British fauna (Falk & Lewington, 2015; Else & Edwards, 2018). Examination of *A. apicata* material from Britain and Ireland shows that only one male form is present, the form with a long basal mandibular tooth. However, female material does not conform to the characters described by Schmid-Egger & Scheuchl (1997), with there being only a very weak projection at the base of the mandible, specimens thus nominally resembling *A. batava*.

Type examination was therefore necessary, the type material of *A. batava* being held in Paris in the Pérez collection. Interestingly, though designating many lectotypes for species in the Pérez collection, Warncke (1967) made no note of a lectotype, and only stated that he considered this taxon conspecific with *A. apicata*. This suggests that he may not have examined the type series, especially since he wrote that the taxon comes from "Holland". Whilst this is broadly correct, and it is what was written directly in Pérez (1902: 175), more unpublished detail is available. In the personal notes of Pérez (Pérez, unpublished), under the entry for *A. batava* it is written: 1747 *Andrena Batava JP Nombr.* ♀♂ *de Leyde* (*Ritsema*) *sous le nom de* <u>*lapponica*</u> ♀ *&* <u>*praecox*</u> ♂, *un couple de Brême* (*Alfken*) *sous le nom* <u>*d'apicata*</u> *Sm.*

Figs 1-2. 1, *Andrena apicata* Smith, 1847, male mandible, lateral view. 2, *Andrena batava* Pérez, 1902, male mandible, lateral view.

For context, Coenraad Ritsema was the curator of the Rijksmuseum van Natuurlike Historie in Leiden [=Leyde in French] from 1873 to 1916, thus this is consistent with the type locality and period of capture. In the Paris collection, there are a series of specimens of *A. batava*. One female with a collecting locality of "Holland" has a lectotype label and a determination label written by H. Teunissen in 1984 (Figs 3-8). It is not clear if Teunissen added the lectotype label, but in any case, as this lectotype designation was never published it is invalid. Moreover, there are a series of females and one male with a collecting locality of 'Leyde'. Examination of these specimens shows that they conform to the characters described by Schmid-Egger & Scheuchl (1997), particularly the short basal mandibular tooth of the male. However, in my opinion, females are not consistently distinguishable from *A. apicata* females from the UK, both

Figs 3-8. *Andrena batava* Pérez, 1902, false lectotype. 3, label information. 4, female profile. 5, female face.6, female mandible, lateral view; 7. female dorsum. 8, female terga.

sets of females having only a weak projection at the base of the mandible. In order to cement the concept in line with the existing literature concept, and to ensure clarity, an unambiguous male *A. batava* is selected as a lectotype, by present designation (Figs 9-14). The specimen displays the key characters for the taxon, namely the relatively short mandibular tooth (Fig. 12), the predominantly black hairs on the propodeum (Figs 12-13), and the apically truncate (not emarginate) S8 (Fig. 14).

In order to confirm the difference between *A. apicata* and *A. batava*, specimens were analysed genetically. There have been issues sequencing the *COI* gene for this species pair, with only short (unpublished) sequences generated by Schmidt *et al*. (2015). In the present work, only one 616 base pair sequence was successfully amplified from an *A. batava* male. In a phylogenetic

Figs 9-14. *Andrena batava* Pérez, 1902, lectotype, by present designation. 9, label information. 10, male profile. 11, male face. 12, male mandible, lateral view. 13, male terga. 14, male apex of S8.

tree of *Andrena* (*Andrena*) species, *A. apicata* samples from the UK and Ireland fall close to *A. mitis* Schmiedeknecht, 1883 (Fig. 15). Sequences within species were identical (over their area of overlap), with *A. apicata/A. mitis* separated by 0.81%. The *A. batava* sample falls away from this species pair, separated from *A. mitis* by 2.78% and from *A. apicata* by 3.06%. This result confirms the low intraspecific genetic diversity observed within *A. mitis* and the genetic proximity of these three species observed by Schmidt *et al*. (2015), whilst also confirming the status of *A. batava* as a distinct taxon.

Future barcoding work focused on series of females may allow for the confirmation or discovery of characters that allow for the consistent separation of *A. apicata* and *A. batava* females, but for now females are treated as inseparable without concurrently active males at the same site. This will also clarify the exact European ranges of the two taxa, but what can be said with certainty is that both are present in sympatry in Belgium. *Andrena batava* seems more frequent, certainly in the damp woodlands and marshes of Flanders. Examination of a limited number of specimens in other European museums confirms the presence of *A. batava* in north-eastern Austria, north-western France, northern Germany, and southern Sweden. It is not expected to be present in the mountains of southern Europe, but this must be established, along with its northern and eastern range limit as Warncke (in Gusenleitner & Schwarz, 2002) considered *A. apicata* s.l. to extend into the Baltics and southern Finland as well as the European part of Russia.

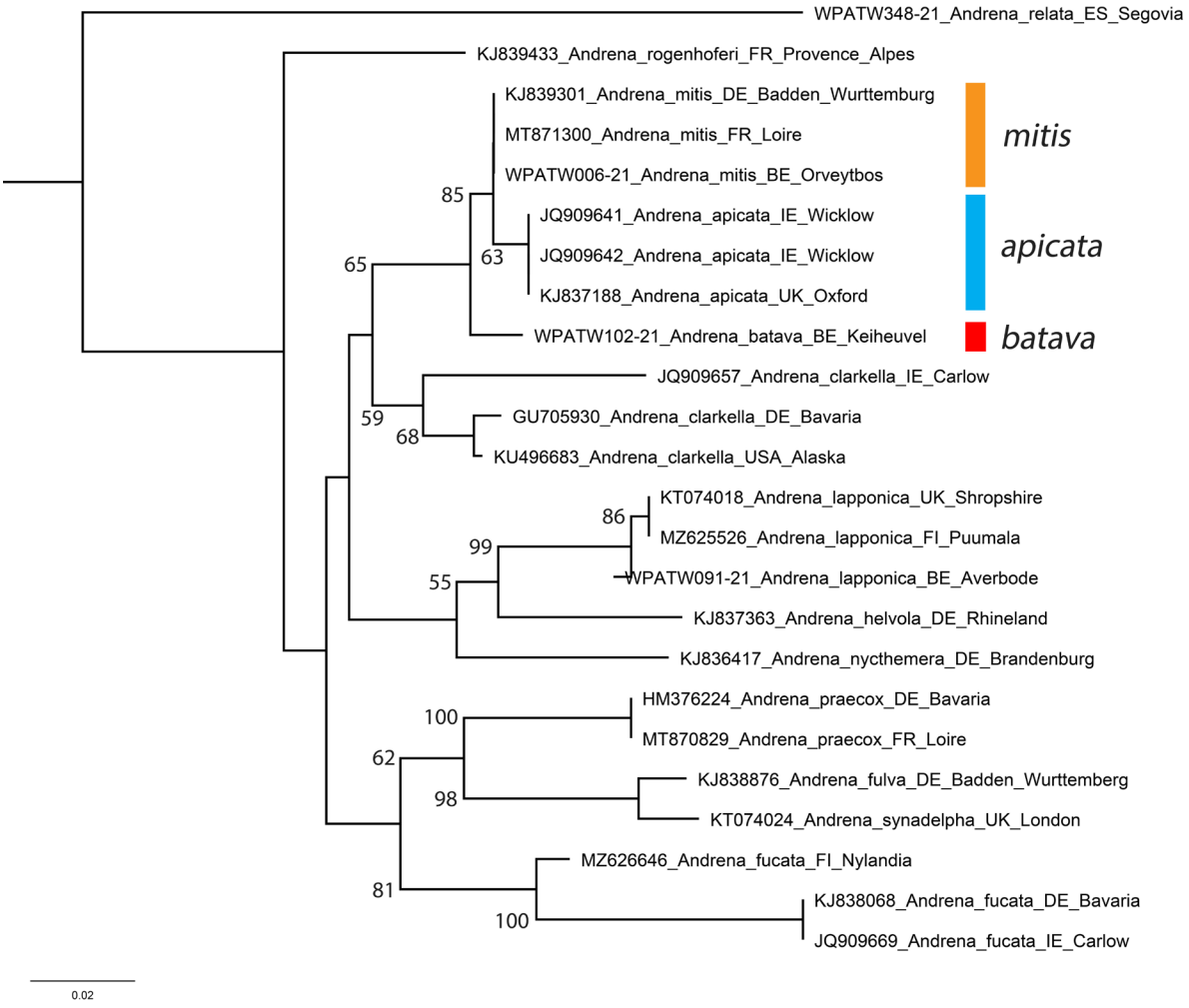


Fig. 15. Phylogenetic tree (neighbour joining) of *Andrena* subgenus *Andrena* based on the mitochondrial *COI* gene with *A. relata* as an outgroup. Numbers adjacent to branches represent posterior probabilities (values of < 0.5 are omitted).

Figs 16-17. *Andrena mitis* Schmiedeknecht, 1883, lectotype, by present designation. 16, label information. 17, female profile.

Separately, searches in the RMNH general *Andrena* collection revealed the presence of several specimens labelled with Pérez's distinctive handwriting. These specimens belonged to some of the *Andrena* species described by Otto Schmiedeknecht in his 1883 monograph on European bees (Schmiedeknecht, 1883). Several taxa were described based on material sent to Schmiedeknecht by Pérez, including *A. mitis*, type material of which has been considered lost (Gusenleitner & Schwarz, 2002), as specimens are typically not present in the Pérez collection in Paris (though see Le Divelec, 2021 for *Andrena gallica* Schmiedeknecht, 1883). For *A. mitis*, Schmiedeknecht (1883: 605) writes "Andrena mitis Perez [sic] in litt." for the description of this species, giving a distribution of "Habitat in Gallia prope Bordeaux". A female specimen is preserved in the RMNH collection, which is known to contain material from Schmiedeknecht's collection (F. Bakker pers. comm., IX.2022), though the exact provenance of these *Andrena* specimens is unclear. Given that this female specimen is labelled with Pérez's handwriting, the specimen comes from the locality mentioned by Schmiedeknecht in the original description of the species, and additional taxa were found in the RMNH collection that also conformed to these conditions, the specimen is considered to be part of the original syntypic series and is designated as a lectotype (Figs 16-17). Three additional lectotypes for species described by Schmiedeknecht (1883) and until now considered lost will be designated in an upcoming publication on the Iberian *Andrena* fauna.

Andrena apicata Smith, 1847

Material examined. **BELGIUM**: • 1♂, Oudsberg, Dornerheide, 12.iii.2017, leg. K. Janssen, K. Janssen Collection • 2♂, Schipgatduinen, Koksijde, 26.iii.2017, leg. K. Janssen, K. Janssen Collection • 1♀, 2♂, Stoumont, La Gleize, 14.iv.2013, leg. K. Janssen, K. Janssen Collection; **FRANCE**: • 1♂, Bruay-la-buissiere, 11.iii.2019, leg. V. Lecocq, CEN-NPC • 1♀, 1♂, Lapugnoy, 18.iii.2019, leg. V. Lecocq, CEN-NPC; **IRELAND**: • 1♀, 4♂, Ballyhenry, Co. Wicklow, 29.iii.1925, leg. E.F. Bullock, NMINH • 1♀, 1♂, Bohernabreena, 2.iv.1923, NMINH • 3♂, Enniskerry, 25.iii.1931, leg. A.W. Stelfox, NMINH • 1♂, Meeting of the Waters, 3.iv.1931, leg. A.W. Stelfox, NMINH; **UNITED KINGDOM**: • 1♂, Rewell Wood, west of Arundel, 11.iii.2007, leg. G.R. Else, TJWC • 1♀, East Dartmoor, 15.iv.1914, leg. R.C.L. Perkins, NMINH • 1♂, 1♀, East Dartmoor, 2-20.iv.1923, leg. R.C.L. Perkins, NMINH • 1♀, Eastleigh, 8.iv.1914, leg. R.C.L. Perkins, NMINH • 1♂, Surrey, East Horsley, Sheepleas, 31.iii.1999, leg. D.W. Baldock, TJWC.

Andrena batava Pérez, 1902

Lectotype. **NETHERLANDS**: • 1♂, Leyde [Leiden], MNHN (lectotype by present designation). Illustrated Figs 9-14.

Material examined. **AUSTRIA**: • 1♂, Oberweiden, 15.iv.1936, leg. R. Schmidt, OÖLM; **BELGIUM**: • 1♂, Antwerp, Balen, Keiheuvel, 28.iii.2019, leg. W. Vertommen, TJWC • 1♂, Bolderberg, Wilg, 22.iii.2010, leg. K. Janssen, K. Janssen Collection • 1♀, 1♂, Broekstraat, Zelem, 7.iv.2013, leg. K. Janssen, K. Janssen Collection • 2♂, Hasselt, De Maten, 20.iii.2021, leg. K. Janssen, K. Janssen Collection • 1♂, Genk, Heiderbos, 11.iii.2017, leg. K. Janssen, K. Janssen Collection • 1♀, 1♂, Massmechelen, Kikbeekbron, 25.iii.2017, leg. K. Janssen, K. Janssen Collection • 1♀, 1♂, Koersel, 21.iv.2013, leg. K. Janssen, K. Janssen Collection • 1♀, 1♂, Kolenhaven, Beringen, 28.iii.2017, leg. K. Janssen, K. Janssen Collection • 1♂, Limburg, Meldert (Lummen), 21.iii.2020, leg. W. Vertommen, TJWC • 5♂, Rode Vijvers [Natuurgebied Wijvenheide, Hasselt], 8.iii.2014, leg. K. Janssen, K. Janssen Collection • 1♀, 1♂, Genk, Schemmersberg, 9.iv.2016, leg. K. Janssen, K. Janssen Collection • 1♂, Genk, Terril Winterslag, 9.iv.2016, leg. K. Janssen, K. Janssen Collection; **FRANCE**: • 1♂, FR-44 [Loire-Atlantique], Indre, Chaussée de Robert, 26.iii.2019, leg. G. Mahé, G. Mahé Collection; **GERMANY**: • 1♂, Bremen [undated], leg. G. Mercet, OÖLM • 1♂, Hohnebostel, Umg. Celle, 1-30.iv.1944, leg. H. Becker, OÖLM • 2♂, Schwerin, 14-27.iv.1907, leg. H. Friese, SMFD; **NETHERLANDS**: • 4♀, 2♂, Leyde [Leiden], MNHN; **SWEDEN**: • 1♂, Boburg, 8.iv.1941 [no collector information], OÖLM.

Andrena mitis Schmiedeknecht, 1883

Lectotype. **FRANCE**: 1♀, Bordeaux, RMNH (lectotype by present designation). Illustrated Figs 16-17.

Andrena (*Plastandrena*) *nigrospina* Thomson, 1872

The *Apis carbonaria* Linnaeus, 1767 complex has confused taxonomists for years, not least because the type species is actually a scoliid wasp (see Gusenleitner & Schwarz, 2002). Separately from this issue of the oldest correct name, there has been a lack of consensus surrounding the number of taxa, with one and two-taxa solutions proposed. The two-taxa proposal posits that there is a bivoltine taxon, flying mostly in March-April and July-August, and a univoltine taxon that flies mostly in May-June. The situation is complex due to variation in pubescence colour in the female sex, whilst structurally females are impossible to consistently separate between the putative generations or species. Males can be separated only by the examination of the genital capsule, with the bivoltine taxon having a comparatively rounder (less elongate) genital capsule with basally narrow penis valves (Fig. 18) and the univoltine taxon having a comparatively elongate genital capsule with basally broad penis valves (Fig. 19).

Figs 18-19. 18, *Andrena pilipes* Fabricius, 1781, male genital capsule. 19, *Andrena nigrospina* Thomson, 1872, male genital capsule.

A level of stability was reached by Schmid-Egger & Patiny (1997) who proposed the names *A. pilipes* Fabricius, 1781 for the bivoltine taxon which has a more southerly distribution (described from Italy) and *A. nigrospina* for the univoltine taxon (described from Sweden). However, the range extent of these two taxa is not completely clear, and records reported as either *pilipes* or *nigrospina* must be verified. In Belgium, publications have reported either only *A. pilipes* (Leclercq, 1972; Pauly, 1999) or both *A. pilipes* and *A. nigrospina* (Patiny & Terzo, 2010; Drossart *et al*., 2019). Inspection of Belgian material reveals that almost all specimens were recorded between May and June, strongly suggesting that they are *A. nigrospina*, as well as displaying the typical genital capsule for this species (Fig. 19).

Due to an absence of confidently determined *A. nigrospina* material, Schmidt *et al*. (2015) did not come to a firm conclusion on genetic support for these two taxa. In the present work, difficulties were also encountered during sequencing, and only a single barcode could be generated from Belgian material, coming from a female specimen collected from the Belgian coast on August 25th 2021 (see examined material). This sequence clustered with samples collected from Germany, the United Kingdom, Italy, France, and Spain (Fig. 20). These specimens were collected between March and August (displaying bivoltine behaviour) and, for male specimens, display the typical genital capsule for *A. pilipes*. Nine sequences from Germany, Finland, Kyrgyzstan, Norway, and Spain clustered together, these specimens being collected between 11th May and 13th July. Though no sequences could be generated from specimens with the typical *A. nigrospina* genital capsule (Spanish specimens were female), the phenology

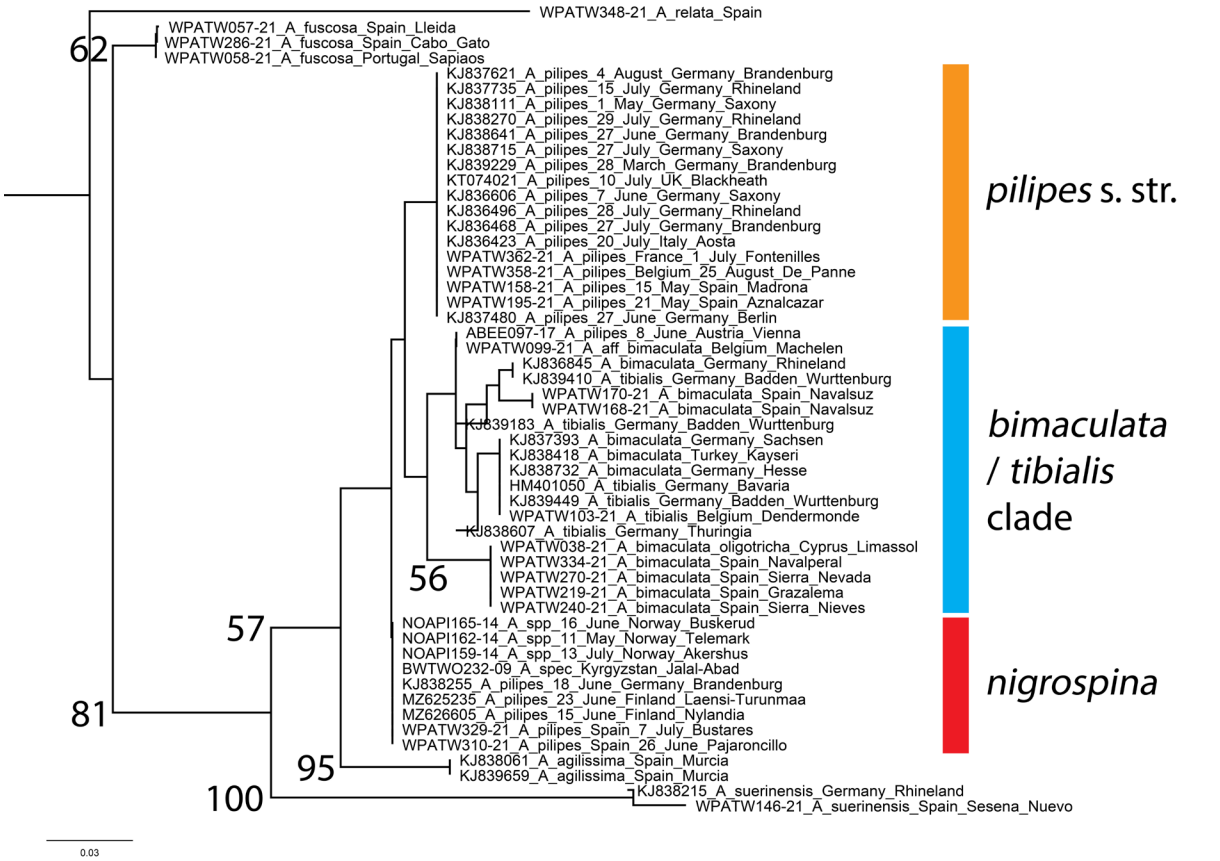


Fig. 20. Phylogenetic tree (neighbour joining) of *Andrena* subgenera *Melanapis, Suandrena,* and *Plastandrena* based on the mitochondrial *COI* gene with *A. relata* Warncke, 1975 as an outgroup. Numbers adjacent to branches represent posterior probabilities (values of < 0.5 are omitted). All members of the *pilipes/nigrospina* complex are labelled as *'pilipes*', with the date of capture indicated. Specimens captured from March-August correspond to the bivoltine taxon *A. pilipes* Fabricius, 1781 and those captured in the middle of the season (May, June, early July) correspond to the univoltine taxon *A. nigrospina* Thomson, 1872.

and clear clustering suggests that they are univoltine and correspond to *A. nigrospina*. Each clade showed low intraspecific variation, with the *A. pilipes* clade varying by 0.00-0.37%, the *A. nigrospina* clade varying by 0.00-0.37%, and variation between the clades was 1.13-1.52% (average 1.27%).

Though this is a small overall percentage difference between clades, it is consistent due to low intraspecific variability, and although there is low bootstrap support for the two clades (*pilipes* and *nigrospina*), they are separated by a single clade of intermixed *A. bimaculata* (Kirby, 1802) and *A. tibialis* (Kirby, 1802) that shows strong introgression, with no obvious geographic pattern or order. This includes the red form (*A. bimaculata oligotricha* Mavromoustakis, 1952) known from Cyprus and the Near East which is nested within specimens from Spain. One specimen should be noted is WPATW099-21 which was a dark-haired *Plastandrena* specimen that was originally identified as *A. nigrospina* due to the extensive black hairs. However, along with a specimen from Austria identified as *A. pilipes*, it falls within the *A. bimaculata*/*A. tibialis* clade. It is not clear if this represents a melanic form of *A. bimaculata*, hybridisation, or mitochondrial introgression. The lack of clarity for this group reflects the results of Schmidt *et al*. (2015) and requires additional study with more highly conserved markers (e.g. Gueuning *et al*., 2020), as *COI* analysis appears to produce only these unresolved clades. In contrast, *A. pilipes* and *A. nigrospina* sequences were almost identical within clades, supporting their specific status in addition to the morphological differences in the genital capsules identified by previous authors. Both *A. pilipes* and *A. nigrospina* are therefore confirmed as present in Belgium, though the majority of specimens relate to *A. nigrospina*.

Barcoded or male material for which the genital capsule has been examined (40 specimens examined, indicative records given below) suggests that *A. nigrospina* is widespread, being found in Austria, Belgium, France, Finland, Germany, Hungary, Ireland, Kyrgyzstan, Poland, Turkey, Spain, and the United Kingdom. In line with Schmid-Egger & Patiny (1997), these localities are typically more northerly, with *A. pilipes* dominating in the Mediterranean basin (807 specimens examined, indicative records given below) and also extending into Central Asia to China. A full comprehensive revision is required in order to clarify the range limits of these two taxa, but true *A. pilipes* appears to reach at least as far north as the coasts of the United Kingdom, Belgium, and the Netherlands (Peeters *et al*., 2012; Falk & Lewington, 2015; Else & Edwards, 2018). Though *A. pilipes* has been reported from Ireland (Fitzpatrick *et al*., 2006), based on material in the NMINH, all examined male Irish specimens belonged to *A. nigrospina*, in line with their reported univoltine flight period (see Falk & Lewington, 2015). Whether *A. pilipes* extends further north into northern Germany and Denmark is unclear, as Schmid-Egger & Scheuchl (1997) suggest that it is replaced by *A. nigrospina*, but barcoded specimens show that both taxa can be found in sympatry as far north as Brandenburg (Fig. 20). Barcoded specimens from Norway and Finland fall within the *nigrospina* clade, suggesting that this is the dominant taxon in Fennoscandia, in line with its original description from Sweden.

Andrena pilipes Fabricius, 1781

Material examined. **ARMENIA**: • 1♂, Aragatson prov., Arai [Arayi] mt., 1600-1900 m, 29.vii.2003, leg. V. Zieris, OÖLM; **BULGARIA**: • 6♀, 3♂, Nessebr [Nessebar], 20.vii.1965, leg. Z. Pédr, OÖLM; **BELGIUM**: • 1♀, De Panne, De Westhoek, 25.viii.2021, leg. Y. Gevaert, Y. Gevaert Colln.; **CHINA**: • 13♀, 15♂, Ganguyi [Ganguyizhen], 35 km NE of Yanan [Yan'An, Shaanxi province], 17.v.1996, leg. J. Halada, OÖLM; **FRANCE**: • 1♀, 3♂, Fontenilles, 500 m W, Lespeche, 1.vii.2020, leg. T.J. Wood, TJWC; **GERMANY**: • 4♀, 3♂, Geissmannsdf [Geißmannsdorf], No Lausitz, 19-21.vii.1950, leg. S.G. Bischoff, ZHMB; **GREECE**: • 2♂, Peloponesse, Tegea env., 4.vii.2019, leg. P. Bogusch, TJWC; **IRAN**: • 1♀, 4♂, Yazd, Mehriz to Tang Chenar, 1965 m, 20.iii.2021, leg. S. San, University of Yasouj Collection; **ISRAEL**: •

1♂, Hagalil, 7 km NE Tiberias, Jordan River, 24.iii.1990, leg. R. Leys, RMNH; **ITALY**: • 1♂, Lazio, Roma fe Torraccia, Montebello, 31.iii.1953, leg. Comba, OÖLM; **KYRGYZSTAN**: • 1♀, 1♂, Uchkun weg voorbij Naryn [Uzgorysh], 20.vii.2019, leg. K. Janssen, K. Janssen Collection; **LEBANON**: • 1♂, Der el Ahmar, 3.vii.2019, leg. G. Ghisbain, G. Ghisbain Collection; **MOROCCO**: • 1♀, 3♂, Fès-Meknès, Boulemane, R503, SE of Ait Karmosse, 1750 m, 22.v.2022, leg. T.J. Wood, TJWC; **NORTH MACEDONIA**: • 2♀, 1♂, Lake Dojran, 10.vii.1968, leg. Z. Pédr, OÖLM; **PORTUGAL**: • 2♀, 1♂, Algarve, Carrapateira, 3.iv.2015, leg. T.J. Wood, TJWC; **RUSSIA**: • 2♂, Kuban river [Krasnodar], 20.iv.1972, leg. Kocourek, OÖLM; **SPAIN**: • 4♂, Segovia, Estebanvela, 500 m south, Rio Aguisejo env., 23.vii.2021, leg. T.J. Wood, TJWC; **SYRIA**: • 1♂, Maalula [Maaloula], 3.iv.1979, leg. Kuizelbach, OÖLM; **TAJIKISTAN**: • 3♀, 3♂, Darvaz, 10 km W Tavil-Dara [Tavildara], 9-11.v.1991, leg. J. Halada, OÖLM; **TUNISIA**: • 1♀, 2♂, Hammamet env, 15.iii.1996, leg. K. Deneš, OÖLM; **TURKEY**: • 18♀, 83♂, Burdur, 20 km SW Burdur, 940 m, 7.vii.2006, leg. M. Halada & J. Halada, OÖLM; **UKRAINE**: • 1♀, 1♂, Kherson reg., Ivanovka vill. [Ivanivka], 1-30.iv.2000, leg. V. Gurko, OÖLM; **UNITED KINGDOM**: • 1♂, Devon, Budleigh Salterton, 30.iv.1914, leg. R.C.L. Perkins, NMINH (NMINH:1922.7.1).

Andrena nigrospina Thomson, 1872

Material examined. **AUSTRIA**: • 2♂, Lobau, Magerwiese, 24.v.2019, leg. E. Ockermüller, OÖLM; **BELGIUM**: • 1♀, 1♂, Antwerpen, Schelde, Fort Filip-Van Cauwelaertsluizen, 31.v.2020, leg. J. D'Haeseleer, J. D'Haeseleer Collection • 1♂, Bichterweerd, Elen, 21.v.2008, leg. K. Janssen, K. Janssen Collection • 1♂, Limburg, Bree, 9.vi.1962, leg. J. Leclercq, CEGX • 1♂, Céroux [Céroux-Mousty], 4.vi.1898, leg. P. de Moffarts, RBINS • 1♂, Mont-Saint-Jean, 25.v.1896, leg. P. de Moffarts, RBINS • 1♂, Natuurgebied Negenoord-Kerkeweerd, 21.v.2007, leg. K. Janessen, K. Janssen Collection • 1♂, Sainte Croix [Sint Kruis], 30.v.1975, leg. D.J. Tosquinet, RBINS • 1♂, Walzing [Waltzing], 22.iv.1970, leg. D.J. Tosquinet, RBINS; **FRANCE**: • 1♂, Lozère, Les Vignes, Caxes, 900 m, 29.v.2019, leg. D. Bénon • 1♂, Pyr. Or., Angoustrine, 26.v.1992, leg. H. & J.E. Wiering, TJWC • 1♂, St. Laurent, Ardennes, 20.v.1947, leg. R. Benoist, RBINS; **HUNGARY**: • 1♂, 50 km S Budapest, 2 km E Kunszent [Kunszentmárton], 31.v.1992, leg. C. Schmid-Egger, CEGX; **IRELAND**: • 2♂, Skerries, Co. Dublin, 11.vi.1932, leg. JAJP, NMINH (NMINH:1934.95.1; NMINH:1985.115) • 1♂, St. Mullins, Co. Carlow, 16.v.1935, leg. A.W. Stelfox, NMINH (NMINH:1985.115) • 3♂, Wexford, 30.v.1937, leg. R.A. Phillips, NMINH (NMINH:1937.46.1; NMINH:1937.46.2; NMINH:1937.46.3); **KYRGYZSTAN**: 3♂, prov. Osh, Chauvay-Chay river, 1540 m, 4.vi.2019, leg. J. & L. Halada, OÖLM; **POLAND**: • 1♂, Gmina Narewka, track over Siemianówka lake, 20.vi.2012, leg. K. Janssen, K. Janssen Collection; **SPAIN**: • 4♀, Cuenca, Pajaroncillo, 3 km SW, Arroyo de Peña Quebrada, 26.vi.2021, leg. T.J. Wood, TJWC (barcoded) • 1♀, Guadalajara, Bustares, 2 km N, Alto Rey, 1780 m, 9.vii.2021, leg. T.J. Wood, TJWC (barcoded); **TURKEY**: • 1♂, 10 km N Akseki, 1400 m, 14.vi.1987, leg. K. Warncke, TJWC • 1♂, Kars, 15 km E Karakurt, 1460 m, 2.vi.1988, leg. K. Warncke, OÖLM; **UNITED KINGDOM**: • 1♂, Ripley, Papercourt Gravel Pit, 4.vi.2001, leg. D.W. Baldock, TJWC.

Species definitively excluded from the Belgian fauna

Andrena (*Melandrena*) *barbareae* Panzer, 1805

This taxon has an unclear European distribution due to its synonymy with *A. cineraria* (e.g. Warncke, 1967), though more recent authors have separated the two taxa (Schmid-Egger & Scheuchl, 1997; Amiet *et al*., 2010), with subsequent genetic support (Gueuning *et al*., 2020). Though the full distribution not completely clear, *A. barbareae* appears to be bivoltine and seems to be found in alpine or montane habitats, such as in the Alps, the Spanish and French

Pyrenees, eastern Turkey, and the mountains of Central Asia (Schmid-Egger & Scheuchl, 1997; Amiet *et al*., 2010, TJW unpublished data). This contrasts with *A. cineraria* which is univoltine and found throughout lowland and temperate Europe.

It is therefore surprising that Leclercq & Jacob-Remacle (1982) report *A. barbareae* from Châtillon (Saint-Léger) between 30 July and 5 August 1979. The specimen was captured in blue pan traps, but its currently location is unknown, as it could not be found in either the RBINS or CEGX collections. Given the many identification mistakes made by Leclercq in the genus *Andrena* that are reported here, and the strongly alpine/montane distribution of confirmed *A. barbareae* records in Europe, this record from Belgium must be treated sceptically, and should not be accepted onto the Belgian list without an available specimen. Many spring flying univoltine *Andrena* (e.g. *A. angustior*, *A. scotica*, *A. vaga*) are known to sporadically produce individuals that emerge in the summer or autumn (Else & Edwards, 2018; Wood, 2021; Wood *et al*., 2022), for unclear reasons. This summer individual could therefore simply be an aberrant *A. cineraria*, and the matter will only be fully resolved upon location of the specimen.

Andrena **(***Hoplandrena***)** *bucephala* Stephens, 1846

This taxon was listed in Patiny & Terzo (2010), though this could have referred to northern France only. No specimens of *A. bucephala* from Belgium have ever been located which is surprising since the species is frequent though local in southern England (Else & Edwards, 2018). Its apparent absence from Belgium (along with its specialised parasite *Nomada hirtipes* Pérez, 1884) therefore remains a mystery.

Andrena (*Euandrena*) *chrysopus* Pérez, 1902

This taxon was included in the Belgian Red List as 'Data Deficient' (Drossart *et al*., 2019). There is no evidence for the presence of this taxon in Belgium. Warncke *et al*. (1974) give the Rhine valley in western Germany as the western range limit. *Andrena chrysopus* is a specialist of *Asparagus* (Asparagaceae) (Westrich, 1989), making its presence in Belgium unlikely.

Andrena (*Chlorandrena*) *cinerea* Brullé, 1832

This taxon was included in the Belgian Red List as 'Least Concern' (Drossart *et al*., 2019). There is no evidence for the presence of this taxon in Belgium. This species has a largely Mediterranean distribution, extending northwards along the western coast of France (Warncke *et al*., 1974; Gusenleitner & Schwarz, 2002). It has not been recorded from Switzerland, Germany, or Austria (Schmid-Egger & Scheuchl, 1997; Amiet *et al*., 2010). This error is likely to result from a databasing problem and the confusion between *A. cinerea* and *A. cineraria*.

Andrena (*Holandrena*) *decipiens* Schenck, 1861

This taxon was included in the Belgian Red List as 'Not Applicable' (Drossart *et al*., 2019), presumably following the listing in Rasmont *et al*. (1995) who listed the taxon as present in Belgium. There is no evidence that this extends north to Belgium. Warncke *et al*. (1974) presented a distribution map with *A. decipiens* extending north to the Belgian border, but not crossing over into Belgium itself. There is additional complexity due to the presence of the cryptic taxon *A. flavilabris* Schenck, 1861 which was previously thought to comprise the spring generation of *A. decipiens*, but it was returned to species status by Manderey *et al*. (2008). Examined material from France shows these taxa extending to around 49ºN, so in future years they may colonise Belgium.

Andrena decipiens Schenck, 1861

Material examined. **FRANCE**: • 1♂, Sévigny, 1924, leg. Benoist, RBINS • 1♀, 1♂, Tours, Fondettes, 4.vii.2020, leg. T.J. Wood, TJWC.

Andrena flavilabris Schenck, 1861

Material examined **. FRANCE**: • 1♀, 1♂, Calvados, Canon, Ferme de Canon, 30.iv-2.v.2019, leg. T.J. Wood, TJWC • 1♂, Bas-Rhin, Traenheim, 17.iv.2019, leg. T.J. Wood, TJWC.

Andrena (*Micrandrena*) *distinguenda* Schenck, 1871

This taxon has been confused in Belgium, and more broadly across Europe. It was originally recorded from Belgium by Leclercq (1972) as *A. obsoleta* Pérez, 1895 on the basis of a single bibliographic record which is obscure. The use of the name *A. obsoleta* to apply to this taxon derives from the work of Warncke who believed that *A. distinguenda* was a preoccupied name, thus selecting *A. obsoleta* as the oldest name for this taxon and creating the replacement name *A. spongiosa* Warncke, 1967 for *A. distinguenda* Warncke then applied a subspecific system, listing *A. obsoleta spongiosa* (=*A. distinguenda*) and *A. obsoleta nitidula* Pérez, 1903 from Belgium (Warncke *et al*., 1974). However, other authors have considered *A. distinguenda* to be a valid name and have applied it to the European population (see Burger & Herrmann, 2003). Subsequently, *A. distinguenda* was also recorded in Belgium by Pauly (1999), Patiny & Terzo (2010), and Drossart *et al*. (2019, as 'Regionally Extinct').

Regardless of the name used, there is no evidence of the presence of this taxon in Belgium. In the revisionary work of Burger & Herrmann (2003) *A. distinguenda* was only recorded as far north as the Rhine valley in Germany, an area that is noticeably warmer than Belgium. A single specimen determined as *A. distinguenda* by Leclercq could be found in the Brussels collection, but it corresponds to *A. niveata* Friese, 1887. Further discussion and clarification of the taxonomic confusion surrounding this species will be published in an upcoming revision of Iberian *Andrena* (TJW, *in review*).

Andrena niveata (misdetermined as *A. distinguenda* by J. Leclercq).

Material examined. **BELGIUM**: • 1♀, Braine [Braine-l'Alleud], 6.v.1896, leg. P. de Moffarts, RBINS.

Andrena **(***Euandrena***)** *granulosa* Pérez, 1895

Listed as '?' by Patiny & Terzo (2010). There is no evidence for the presence of this species in Belgium; it extends north to the Rhine valley in western Germany (Warncke *et al*., 1974) and may in the future be found in Belgium.

Andrena (*Simandrena*) *lepida* Schenck, 1861

Listed as '?' by Patiny & Terzo (2010). There is no evidence for the presence of this species in Belgium.

Andrena (*Melandrena*) *morio* Brullé, 1832

Listed as '?' by Patiny & Terzo (2010). There is no evidence for the presence of this species in Belgium.

Andrena (*Micrandrena*) *nanula* Nylander, 1848

Listed from Belgium by Rasmont *et al*. (1995), Pauly (1999), Patiny & Terzo (2010), and Drossart *et al*. (2019, as 'Regionally Extinct'). There is no evidence for the presence of this species in Belgium. The closest record is from Echt in the Netherlands, which is on the Belgian border. This information comes from the record cards maintained at CEGX which give the following information: 1♀, N.-L, Echt, 19.viii.48 [presumably 1948], 1♀, N.-L, Echt, 1.x.48. Specimens were determined by H. Teunissen in 1986, though I have not seen these specimens and I am unable to validate them. There are no entries for Belgium. Warncke *et al*. (1974) give a dot on their distribution map for eastern Belgium (Limburg), but this grid also includes Dutch

Limburg, and therefore Echt. This point cannot unambiguously be assigned to exclusively Belgian territory; though it is likely the source for the Rasmont *et al.* (1995). Without direct evidence of specimens collected from Belgium, it cannot be considered part of the fauna.

Andrena (*Hamandrena*) *nasuta* Giraud, 1863

Listed as '?' by Patiny & Terzo (2010). There is no evidence for the presence of this species in Belgium. Moreover, as it is a specialist of *Anchusa* (Boraginaceae), its presence would be highly unlikely.

Andrena (*Micrandrena*) *nitidula* Pérez, 1903

This taxon was recorded from Belgium by Patiny & Terzo (2010) and Drossart *et al*. (2019, as 'Regionally Extinct'). *Andrena nitidula* has been confused with *A. distinguenda* (see Burger & Herrmann, 2003); there is also no evidence for the presence of this taxon in Belgium, reaching north only to southern Germany (Burger & Herrmann, 2003). This listing derives from the distribution maps of Warncke *et al*. (1974); given the lack of available material, taxonomic confusion, and misidentified specimens that can be located, *A. nitidula* is not considered to be part of the Belgian fauna.

Andrena (*Hoplandrena*) *nuptialis* Pérez, 1903

Listed by Patiny & Terzo (2010). There is no evidence for the presence of this species in Belgium; Warncke *et al*. (1974) give the western limit in the Rhine valley in western Germany.

Andrena (*Notandrena*) *pallitarsis* Schenck, 1853

Listed as '?' by Patiny & Terzo (2010). There is no evidence for the presence of this taxon in Belgium. The distribution maps of Warncke (see Gusenleitner & Schwarz, 2002) indicate the presence of this taxon in north-western Germany along the Rhine, and these warm areas are probably the limit of the northern range for this predominantly central European taxon.

Andrena (*Cnemidandrena*) *simillima bremensis* Alfken, 1900

Rasmont *et al*. (1995) list *A. s. bremensis* from Belgium with no supporting data; this citation was given by Pauly (1999) without further information. There is no direct evidence for the presence of this taxon in Belgium, though it has been recorded from close to the border in the Dutch province of Limburg, and also from the north of France (see Le Divelec, 2021). Warncke *et al*. (1974) give distributional dots for *A. simillima* s. str. from northern France close to the Belgian border, and or *A. s. bremensis* for the Limburg area (including Belgian and Dutch Limburg). As for preceding species, this dot cannot be unambiguously be considered to be from Belgian territory, and probably refers to the specimen from Dutch Limburg. No Belgian specimens could be found in any of the examined museum collections, and given the antiquity of the Dutch record, if the taxon was ever present in Belgium it must now be long extinct.

Material examined. **NETHERLANDS**: • 1♀, Venlo [Limburg], 9.vii.1877, leg. v. d. Brandt, det. J.D. Alfken, RMNH.

Andrena (*Micrandrena*) *spreta* Pérez, 1895

Listed by Drossart *et al*. (2019, as 'Data Deficient'). This is a taxonomic hangover arising from the listing of *A. pusilla* Pérez, 1903 in combination with *A. spreta* (e.g. *A. spreta pusilla*, see Leclercq 1972 Warncke *et al*., 1974). *Andrena pusilla* is a valid taxon that is present in Belgium; *A. spreta* is distinct and found in the Mediterranean basin; this will be dealt with in an upcoming revision.

Andrena (*Hoplandrena*) *stragulata* Illiger, 1806

Listed by Patiny & Terzo (2010). The taxonomic status of *A. stragulata* was resolved by Reemer *et al*. (2008). It represents the spring generation of the bivoltine taxon *A. rosae* Panzer, 1801. It should therefore be listed solely under this taxon.

Andrena (*Suandrena*) *suerinensis* Friese, 1884

Listed as '?' by Patiny & Terzo (2010). Another taxon that the distribution maps of Warncke (Gusenleitner & Schwarz, 2002) indicate may come close to the Belgian border, but for which no Belgian specimens are known. Its distribution in the Benelux region is probably limited to warm areas around the river Rhine in Germany (Warncke *et al*., 1974).

Recently resolved taxonomic and nomenclatural issues

Andrena (*Taeniandrena*) *afzeliella* (Kirby, 1802)

The subgenus *Taeniandrena* is taxonomically challenging, and contains many cryptic species that are extremely difficult to separate from each other morphologically. Recent revisions have confirmed that *Andrena ovatula* (Kirby, 1802) sensu Warncke is composed of at least five valid species in Europe, and an unclear number in the West Palearctic (Praz *et al*., 2022). Two of these taxa are present in Belgium, specifically *A. ovatula* and *A. afzeliella*. Both taxa are bivoltine, with *A. afzeliella* flying approximately one month after *A. ovatula* in both generations, though the two species can be found in spatial and temporal sympatry (Praz *et al*., 2022). The taxon *A. afzeliella* has previously been referred to as *A. albofasciata* Thomson, 1870 by other authors who adopted a two taxon approach (e.g. Stöckhert, 1930; Smissen, 2010). I do not know of any specific paper that reported two species within the *ovatula*-group in a Belgian context, as such papers have either focused on other European countries, or authors have followed the Warncke consensus (e.g. Leclercq, 1972; Pauly, 1999; Patiny & Terzo, 2010; Drossart *et al.*, 2019).

Andrena (*Simandrena*) *propinqua* Schenck, 1853

Considered to be a subspecies of *A. dorsata* (Kirby, 1802) (Warncke, 1967), more recent authors have separated the two taxa (Schmid-Egger & Scheuchl, 1997). This was recently supported by genetic analysis (Gueuning *et al*., 2020), and both taxa are present in Belgium, based not only on the distribution maps of Warncke (Gusenleitner & Schwarz, 2002) but also on museum and recently collected material. Indicative records are given here (15 females and 28 males examined in total).

Material examined. **BELGIUM**: • 2♀, Baugnée, 3.iv.1894, leg. P. de Moffarts, RBINS • 3♂, Braine-l'Alleud "Tout-lui'faut", 12.iv.1995, leg. Remacle, CEGX • 1♀, Mons, Park Terril de l'Héribus, 15.vii.2019, leg. T.J. Wood, TJWC • 3♂, Rangeerstation Antwerpen-Noord, Grote Kreek, 24.iii.2021, leg. K. Schoonvaere, K. Schoonvaere Collection • 2♂, Uccle, 3.iv.1926, leg. A. Crèvecoeur, RBINS.

Andrena (*Hoplandrena*) *scotica* Perkins, 1916

The subgenus *Hoplandrena* has several species that are bivoltine and which display morphological variation between generations, leading to a number of synonymous names being created. The creation of multiple names has also obscured the correct name to apply to one of the most common European spring univoltine *Andrena* species that is currently widely referred to as *A. carantonica* Pérez, 1902. Wood *et al*. (2022) provide a detailed review of the nomenclatural confusion surrounding this taxon and establish *A. scotica* as its correct name, but the problem has principally concerned uncertainty over the number of taxa that are similar to the bivoltine *A. trimmerana* (Kirby, 1802), with three names used in some publications (e.g. *A. spinigera* (Kirby, 1802)-*A. jacobi* Perkins, 1921-*A. trimmerana*, Schmid-Egger & Scheuchl, 1997; *spinigera-carantonica-trimmerana,* Amiet *et al*., 2010). Gueuning *et al*.

(2020) recently confirmed through genetic analysis that only two taxa are present, using the names *A. trimmerana* for the bivoltine taxon and *A. carantonica* for the univoltine taxon.

Examination of type material demonstrates that *A. carantonica* is a *nomen dubium* as it cannot be assigned morphologically to either the bivoltine or univoltine taxon, and in any case it was collected in July and thus is extremely likely to belong to the summer generation of *A. trimmerana* (Wood *et al*., 2022). The oldest available name that can confidently be applied to the univoltine taxon is *A. scotica*. This is because the name *A. trimmerana auctorum* was incorrectly used to refer to the univoltine taxon for over a century until noticed by Perkins (1917), meaning that other European workers did not consider *A. trimmerana auctorum* in need of description.

Therefore, the listings of *A. sabulosa* (Scopoli, 1763) (Leclercq, 1972), *A. jacobi* (Pauly, 1999), and *A. carantonica* (Patiny & Terzo, 2010; Drossart *et al*., 2019) all functionally refer to *A. scotica* (full synonymy and explanation in Wood *et al*., 2022).

Andrena (*Taeninandrena*) *russula* Lepeletier, 1841

This taxon was previously known as *Andrena similis* Smith, 1849 (described from England) in the European literature. However, it is a junior synonym of *Andrena russula* which was described from Algeria (Praz *et al*., 2022). Leclercq (1972) recorded this species under the name *Andrena ocreata* (Christ, 1791) but this is a *nomen dubium*, and this listing functionally refers to *A. russula*, as do the listings of Pauly (1999), Patiny & Terzo (2010), and Drossart *et al*. (2019) under the name *A. similis*. Though rare, and principally recorded from the Ardennes, *A. russula* continues to persist in Belgium.

Material examined. **BELGIUM**: • 1♀, Bomal, 19.v.1966, leg. J. Leclercq, UMONS • 1♂, 2♀, Botassart, 14.v.1895, leg. P. de Moffarts, RBINS • 1♂, 1♀, Botassart, 8.v.1895, leg. P. de Moffarts, RBINS • 1♀, Carlsbourg, RBINS • 1♀, Maasmechelen, Mechelse Heide, 23.iv.2020, leg. M. Jacobs, M. Jacobs Coll.

Species that cannot be confirmed or excluded

Andrena (*Micrandrena*) *alfkenella* Perkins, 1914

This taxon was first listed from Belgium by Rasmont *et al*. (1995), and then subsequently by later authors (Pauly, 1999; Patiny & Terzo, 2010; Drossart *et al*., 2019). There is no evidence for the presence of this species in Belgium, as no specimen details have ever been published. In the RBINS and CEGX collections, only two specimens could be found that were identified as *A. alfkenella*, and both were *A. subopaca*. In the RMNH collection, only a single specimen of true *A. alfkenella* could be found from Gulpen in the province of Limburg, collected in 1894. *Andrena alfkenella* was not recorded from Belgium by Leclercq (1972), but a distributional point consistent with presence in Dutch Limburg can be seen in the map presented by Warncke *et al*. (1974); this large scale map includes Belgium and the southern Netherlands, but no specific national data is presented, and the dot could refer to a specimen caught in Dutch or Belgian Limburg. This map may therefore be the source behind the Rasmont *et al*. (1995) listing as it does not precisely specify if the dot refers to a Dutch or Belgian specimen. The position is taken that this map refers to the Dutch specimen, with no confirmed Belgian records.

In northern Europe, *A. alfkenella* is on the northern edge of its range, and is found in sites with a hot and dry microclimate. In southern England (the country from which the species was described), *A. alfkenella* can be found on dry coastal grassland, heathland, chalk heath, and on chalk grassland (Falk & Lewington, 2015; Else & Edwards, 2018). It is typically uncommonly encountered but at suitable sites it can be locally abundant. The record cards maintained at CEGX list the following information concerning *A. alfkenella*. Firstly, the record card is written in the handwriting of H. Teunissen, with ‘det. H. Teun.’ indicated in the ‘Col./

Ref.' section. Four specimens are indicated: 1♂, Lg, Bassenge, 30.iv.86 [presumed 1986]; 1♂, Op Kanne, 4.v.86 [presumed 1986]; 1♂, HL, Maastr. [additional information illegible], 16.vii.86 [presumed 1986]; 1♀, HL, Maastr. [additional information illegible], 22.vii.86 [presumed 1986]. Two of these specimens come from the Netherlands (Maastricht). The record card gives no information as to the location of these specimens, but one male matching the collection details of the specimen from Maastricht on 16.vii.1986 was found in the RMNH collection (see below). This specimen was determined as *A. alfkenella* by Teunissen, but is actually *A. minutula*. Given the variable and often inconsistent *Andrena* identifications of Teunissen, the remaining records cannot be considered as valid until specimens can be located and re-examined.

Based on the correctly identified female specimen from Gulpen, the historical presence of this species in Dutch Limburg is therefore consistent with this ecological preference. The species may have been present in Belgian Limburg on the chalk overlooking the Meuse valley, as this area has the warmest and driest microclimate in Belgium. Several Belgian *Andrena* taxa were more or less limited to this habitat type, with all verified *A. chrysopyga* Schenck, 1853 records and the majority of confirmed *A. combinata* (Christ, 1791) records coming from this part of Belgium. Both of these species are currently regionally extinct in Belgium (last known records from 1946 and 1961, respectively), and the same conclusion must be drawn for *A. alfkenella*, if it was ever present in the first place. This taxon is however included in the identification key below, in case it may reappear in Belgium.

Andrena alfkenella Perkins, 1914

Material examined. **NETHERLANDS**: • 1♀, Gulpen [Limburg], 29.vii.1894, det. J. v. d. Vecht, RMNH (determination confirmed by TJW).

Andrena minutula (Kirby, 1802)

Material examined. **NETHERLANDS**: • 1♂, Maastricht, 16.vii.1986, leg. B.V. Lefeber, RMNH (misdetermined as *A. alfkenella* by H. Teunissen 198-) • 1♂, Valkenburg, 30.vi.1986, leg. B.V. Lefeber, RMNH (misdetermined as *A. alfkenella* by H. Teunissen 1990).

Andrena subopaca Nylander, 1848

Material examined. **BELGIUM**: • 1♀, F. Sgns [Forêt de Soignes], 29.iv.1934, leg. A. Crèvecoeur, RBINS (misdetermined as *A. alfkenella*) • 1♀, Uccle, 15.iv.1934, leg. A. Crèvecoeur, RBINS (misdetermined as *A. alfkenella*).

Andrena chrysopyga Schenck, 1853

Material examined. **BELGIUM**: • 1♂, Loën, 30.v.1937, UMONS; • 1♂, Loën, 30.v.1939, RBINS • 1♂, Montagne Saint-Pierre, 5.iv.1946, leg. A. Collart, RBINS.

Andrena combinata (Christ, 1791)

Material examined. **BELGIUM**: • 1♂, Auffe, 20.vi.1951, RBINS • 1♀, Eben, 18.vi.1932, leg. P. Maréchal, RBINS • 1♂, Eben, 13.vi.1936, leg. P. Maréchal, RBINS • 1♂, Ében-Émael, 18.v.1961, leg. J. Leclercq, UMONS • 3♂, Loën, 19.v.1934, leg. P. Maréchal, RBINS • 2♂, Loën, 13.vi.1936, RBINS • 1♂, Loën, 30.v.1937, leg. P. Maréchal, RBINS • 1♂, 2♀, Loën, 30.v.1939, leg. P. Maréchal, RBINS • 1♂, Loën, 3.vi.1939, leg. P. Maréchal, RBINS • 1♂, 1♀, Petit Han, 31.v.1936, leg. J. Leclercq, RBINS • 2♂, Torgny, 31.v.1931, leg. P. Maréchal, RBINS.

Andrena (*Micrandrena*) *anthrisci* Blüthgen, 1925

This species has been confused with *Andrena semilaevis* Pérez, 1903, as well as with *Andrena minutuloides* Perkins, 1914. It was listed from Belgium by multiple authors (Leclercq,

1972; Rasmont *et al*., 1995; Pauly, 1999; Patiny & Terzo, 2010; Drossart *et al*., 2019), but no specimen information is available. Schwenninger (2009) carefully revised material of *A. anthrisci* with a focus on Germany, finding the species as far north as Brandenburg (Mühlberg-Martinskirchen), Hessen (Darmstadt; Gudensberg), North Rhine-Westphalia (Cologne), and Rhineland-Palatinate (Landau). The closest record is some 60 km from the Belgian border.

The record cards maintained at CEGX list the following information concerning *A. anthrisci* in Belgium: 1♀, Loën, 6.vi.1925 (Belg. nov. sp.). Despite examination of material in the RBINS and CEGX collections, no Belgian specimens even putatively identified as *A. anthrisci* could be located. This is peculiar, as Leclercq (1972: carte 613) shows three dots indicating specimens that he examined that were collected from the Ardennes after 1950. The specimen from Loën is indicated on the distribution map as a verified pre-1950 specimen. Warncke *et al*. (1974) also present multiple dots in eastern Belgium on their distribution map for this species; it is not clear exactly which species concept is being used due to historical confusion as to the treatment of this species (see Schwenninger, 2009). It is not impossible that *A. anthrisci* could be present in the Belgian Ardennes, though all examined material from this region has so far conformed to *A. semilaevis*, but it must remain unconfirmed until specimens are available. This taxon is included in the identification key below due to its possible presence in Belgium.

Andrena (*Micrandrena*) *floricola* Eversmann, 1852

This taxon was reported from Belgium by Leclercq (1972: carte 615) with a single datapoint representing a specimen "captured or observed prior to 1950, published or not, but certified by the author of the map". The record cards maintained at CEGX list the following information concerning *A. floricola* in Belgium: 1♀, Buizingen, 5.iv.1883 (Belg. nov. sp.). Inspection of material in the RBINS and CEGX could not locate this specimen. Its true identity will probably remain a mystery, but the historic presence of this species in Belgium is credible, as it was recorded once in southern England in 1939 but not subsequently (Else & Edwards, 2018). Though *A. floricola* can be common in southern Europe, it is clearly extremely rare in northern Europe and extinct in many countries. It is included in the identification below in case it may be rediscovered.

Andrena (*Taeniandrena*) *intermedia* Thomson, 1870

Species within the subgenus *Taeniandrena* are highly challenging to identify due to the presence of cryptic diversity (Praz *et al*., 2022). Historical determinations must therefore be treated with a high degree of scepticism and caution. Certain taxa are easier to determine in the female sex (e.g. the species around *A. ovatula*), and some are easier to determine in the male sex due to their distinctive genital capsules. This second group includes *A. intermedia* that has a genital capsule with grossly expanded penis valves, and is therefore unmistakeable amongst central and northern European *Taeniandrena* (see Praz *et al*., 2022; note that there are many problems with the use of the name *A. intermedia* in south-western Europe).

Andrena intermedia has been listed as present in Belgium by all authors (Leclercq, 1972; Rasmont *et al*., 1995; Pauly, 1999; Patiny & Terzo, 2010; Drossart *et al*., 2019). However, the information supporting these listing is scanty. The record cards maintained at CEGX list the following information concerning *A. intermedia* in Belgium: 1♀, Louveigné: Sendrogne, 19.vi.1965, Gx museum [presumably CEGX]; 1♀, Eben, 6.vi.1937, Gx museum [presumably CEGX]; 1♀, Chaudfontaine, vi.1924, leg. J. Leclercq; 1♀, Comblain-au-Pont, 10.vi.1931, Liège, coll. Maréchal, "det. gelriae et citée comme Belg. nov. sp. par Crèvecoeur et Maréchal!". All specimens have therefore been reported from the Liège region (see Leclercq, 1972: carte 637). However, none of these specimens could be located in either the RBINS or CEGX collections.

It is important to note that all cited records are female specimens. In the female sex, *A. intermedia* is very challenging to separate from *A. gelriae* van der Vecht, 1927 and sometimes from *A. wilkella* (Kirby, 1802). Moreover, these collecting dates are generally a little too early for *A. intermedia* females. Confirmed records from northern Germany and the Netherlands have males flying between mid-June and mid-July. Records of *A. intermedia* from the Netherlands are from the northern and eastern part of the country (Smit & Smit, 2020), and indeed the Dutch name (*Noordelijke klaverzandbij*) refers to its northern distribution in that country. There are no confirmed records of this species from Dutch Limburg (Peeters *et al*., 2012; Smit & Smit, 2020), the area bordering the Limburg and Liège regions of Belgium. Moreover, I have examined no confirmed male specimens from Belgium or from northern France.

Given the lack of male specimens, the ecological context, and the lack of records from Dutch Limburg, I consider the historical presence of *A. intermedia* in Belgium highly doubtful. It should only be included on the Belgian list when a male specimen of known providence can be examined, or genetic data are available. However, *A. intermedia* is included in the identification key below to aid this process. The species was originally described from southern Sweden, and does not appear to favour areas with an Atlantic climate, appearing to be absent from western and southern parts of the Netherlands, all of Belgium and the United Kingdom, and northern and western France.

Andrena intermedia Thomson, 1870

Material examined. **GERMANY**: • 1♂, Bremen, 1.vii.1903, leg. J.D. Alfken, RBINS; **NETHERLANDS**: • 1♂, Dwingeloosche Heide, 20.vii.1999, det. T. Peeters, RMNH • 1♂, Sellingen, 25.vi.1972, det. H. Wiering, RMNH • 1♂, Wapserveen, 13.vi.1992, leg. B.A. Afeber, det. H. Wiering, RMNH (all confirmed correctly identified).

Andrena afzeliella (Kirby, 1802)

Material examined. **BELGIUM**: • 1♂, 7♀, Hagaven, leg. Dekoninck & Pauly, RBINS • 5♂, 8♀, Hagaven, leg. Dekoninck & Pauly, RBINS (incorrectly identified as *A. intermedia*).

Andrena wilkella (Kirby, 1802)

Material examined. **BELGIUM**: • 1♀, Philippeville, Tienne al Gatte, 8.vi.1997, leg. Y. Barbier, UMONS (incorrectly determined as *A. intermedia*).

Andrena **(***Melandrena***)** *limata* Smith, 1853

Andrena limata is part of a challenging complex of species that lack clear boundaries across their range, specifically including *Andrena nitida* (Müller, 1766), *Andrena thoracica* (Fabricius, 1775), and *Andrena limata*. In some northern countries, only two taxa are present and are clearly distinct, with no introgression observed, as is the case for *A. nitida* and *A. thoracica* in the United Kingdom (Else & Edwards, 2018). However, in southern Europe the situation is much more complicated, with a convergence in colour pattern. Typical *A. nitida* are univoltine, with *A. limata* and *A. thoracica* showing bivoltine behaviour. However, individuals can appear in the summer with a morphology intermediate between *A. nitida* and *A. limata*. Barcoding results do not provide clarity, with *A. thoracica* forming a monophyletic clade nested within two clades of *A. limata*, with one of these clades containing *A. nitida* sequences (TJW, *unpublished data*). This will be more fully addressed in an upcoming publication on Iberian *Andrena*.

As a result, it is unclear if the use of the name *A. limata* in the northern part of central Europe is actually correct, or may in face refer to aberrant *A. nitida* individuals. A deep revision is required. In a Belgian context, *A. limata* has been reported as present by all authors (Leclercq, 1972; Rasmont *et al*., 1995; Pauly, 1999; Patiny & Terzo, 2010; Drossart *et al*., 2019). As

before, the precise information underpinning this listing is obscure. Leclercq (1972: carte 643) gives only a single point from the extreme south of Belgium that was "captured or observed prior to 1950, published or not, but certified by the author of the map". No specimens could be found in the RBINS or CEGX collection. Warncke *et al*. (1974) give dots for *A. limata* in France that approach, but never enter Belgium.

The record cards maintained at CEGX list a number of *A. limata* records, all of which come from France. The two closest come from Villers-le-Tilleul in 1907 and Vendresse in 1921, about 20 km from the Belgian border. It is impossible to say what species concept was being used. I have examined a single undated specimen that nominally conforms to *A. limata* from northern France, around 35 km from the Belgian border (see below). Without examination of a Belgian specimen, it is impossible to say whether or not it was present historically, but it currently appears to be absent.

For *Andrena thoracica*, no Belgian specimens are conserved in the RBINS or CEGX collections. The CEGX record cards list the following information from the collection of Maréchal (Liège): 1♂, Virton, 28.iv.1918; 1♀, Ethe [Virton], 9.v.1918; 1♀, de Ciergnon à Vignée, 14.vi.1951. The records cards also list a larger number of *A. thoracica* records from the Netherlands from the late 19th and early 20th century. The distribution map of Leclercq (1972: carte 646) includes the Maréchal specimens, but also five additional points. It is not clear what data support these additional records. Although no *A. thoracica* specimens could be found, there is no doubt that this taxon was a part of the Belgian fauna due to these historical records and the documented presence of this taxon in the Netherlands (though it was last seen in 1972, Peeters *et al*., 2012) and the United Kingdom (where it remains common at coastal sites and occasionally inland, Else & Edwards, 2018). In northern Europe, it cannot be confused with *A. nitida* or *A. limata* due to the abundant black hair laterally on the mesosoma, and thus these historical determinations are assessed to be correct.

Andrena limata Smith, 1853

Material examined. **FRANCE**: • 1♀, Germont [Ardennes], leg. Pigeot, A+R Dervin Colln, I.G.33.241, RBINS.

Species new or confirmed present in Belgium

Andrena (*Melandrena*) *assimilis* Radoszkowski, 1876

The exact status of *A. assimilis* has been unclear because of confusion with *A. gallica* Schmiedeknecht, 1883, the type of which was recently found (Le Divelec, 2021). The two taxa were recently synonymised (Wood & Monfared, 2022) as characters for separation depended on the colour of the wing venation, which is highly variable, even in the wing of a single specimen. The darker form is typically found in hotter and drier areas, and the lighter form in cooler and wetter areas. Patiny & Terzo (2010) listed the presence of *A. gallica* as uncertain in Belgium and northern France, possibly because the distribution maps of Warncke (Gusenleitner & Schwarz, 2002) suggests its presence close to the southern part of the country, though the taxon has never been positively confirmed as present in Belgium.

Inspection of material in RBINS revealed the presence of a specimen in the collection of Constantin Wesmael (1798-1872). The specimen bears only the number '1196' (Fig. 21), and it is unclear to what this refers, making its collecting locality currently impossible to determine with confidence. The specimen is clearly *A. assimilis* (Fig. 22), and interestingly it bears a handwritten label by William Nylander (1822-1899), a Finnish botanist and entomologist who worked on Scandinavian *Andrena*, publishing an important work describing several northern and widespread species (Nylander, 1848). The label indicates that the specimen represents a

Figs 21-22. *Andrena assimilis* Radoszkowski, 1876,. 21, label details. 22, female profile.

new species, "*Nova species ex sententia*" [new species, in the opinion of Nylander]. Assuming that the specimen was collected and examined in the mid-1800s, which is logical given the period of activity of both Wesmael and Nylander, this judgement is correct as *A. assimilis* was eventually described in 1876. It is unclear why no further action was taken by either worker, but the specimen was clearly not published. Wesmael collected in southern Belgium, though he predominantly collected around Brussels, and so *A. assimilis* may have therefore been present in the 19th century.

Regardless of its historical presence or absence, *A. assimilis* can conclusively be included in the Belgian fauna due to its unexpected presence at a botanical garden just north of Brussels in 2021. The presence of a large and conspicuous *Andrena* in central Belgium without previous records is unusual, and merits further study.

Material examined. **BELGIUM**: • 1♀, Vlaamse Brabant, Meise, Plantentuin, 2.viii.2021, leg. O. Foubert, O. Foubert collection.

Andrena (*Simandrena*) *confinis* Stöckhert, 1930

Andrena confinis was considered by Warncke (1967) to be a junior synonym of *A. congruens* Schmiedeknecht, 1884. The two taxa are nonetheless distinct (Schmid-Egger & Scheuchl, 1997; Le Divelec 2021), with *A. confinis* broadly favouring cooler parts of central and northern Europe (e.g. northern France, Le Divelec, 2021), and *A. congruens* broadly favouring warmer parts of central and southern Europe (e.g. southern Germany, Schmid-Egger & Scheuchl, 1997), though a wider taxonomic revision using genetics would be beneficial in clarifying their full distributions. Reports of *A. congruens* from northern countries such as the United Kingdom (Else & Edwards, 2018) actually refer to *A. confinis*. Against this context, it is surprising that neither *A. confinis* or *A. congruens* have been reported from Belgium with certainty, with Patiny & Terzo (2010) listing *A. congruens* as '?'.

Examination of material in RBINS revealed the presence of a 19th century specimen of *A. confinis* that had been mis-determined as *A. albicrus* (Kirby, 1802) which is a synonym of *A. barbilabris* (Kirby, 1802), and the taxon remains present in Belgium, though it is extremely infrequently recorded.

Material examined. **BELGIUM**: • 1♀, Louette St. Pierre [Louette-Saint-Pierre], 13.vii.1870, leg. Gravet, RBINS • 1♀, Brabant Wallon, Virginal-Samme, Quartier du Tram, 10.vii.2020, leg. C. Tourbez, C. Tourbez collection; **FRANCE**: • 1♀, Foret d'Éperlecques, Éperlecques, 5.vii.2018, leg. B. Nicolas, TJWC; **GERMANY**: • 1♀, Burgen a. d. Mosel, 1-30.viii.1929, leg.

Eigen, ZMHB; **UNITED KINGDOM**: • 1♀, Pirbright, Cobbett Hill, 17.iv.2002, leg. D.W. Baldock, TJWC.

Andrena (*Biareolina*) *lagopus* Latreille, 1809

This taxon was recorded in Belgium for the first time in 2020, following its discovery in Luxembourg in 2019 (Herrera Mesías & Weigand, 2021) and concurrent discovery in the Netherlands in 2020 (Tanis & Reemer, 2020). It is clearly expanding its range northwards into north-western Europe. Additional specimens are known from the provinces of Limburg and Luxembourg (W. Vertommen pers. comm., III.2022).

Material examined. **BELGIUM**: • 1♀, Gembloux, Chaussée de Tirlemont, 7.v.2020, leg. T.J. Wood, TJWC • 1♂, Han-sur-Lesse, Rocher Serin et Fond St-Martin, 18.iv.2021, leg. T.J. Wood, TJWC.

Andrena (*Euandrena*) *rufula* Schmiedeknecht, 1883

This species is newly recorded for Belgium based on material collected in the Marais d'Harchies in the south-western part of the country. The presence of this species was somewhat expected, as it has been expanding towards the north. Gusenleitner & Schwarz (2002) give a distribution predominantly across Central Europe, and Warncke *et al*. (1974) list the species in central and eastern France, but the species was recorded in the Netherlands close to The Hague for the first time in 2019 (Reemer, 2019). Since no further specimens have been collected there (M. Reemer pers. comm., II.2022), it was not clear if this was an aberrant or vagrant specimen. However, this new Belgian record implies that it was a genuine specimen that made it to the Netherlands by itself. More broadly, I have also recorded *A. rufula* during 2019 in northern France in the department of Aisne, some 100 km from the Belgian border, so the species does genuinely seems to be increasing its range northwards.

Material examined. **BELGIUM**: • 1♀, Hainaut, Harchies, Marais d'Harchies, 4.v.2021, leg. C. Deleuze, TJWC; **FRANCE**: • 1♀, Aisne, Dampleux, Rue Saint-Leu, apple orchard, 26.iv.2019, leg. T.J. Wood, TJWC • 1♀, Aisne, Le Plessis sur Autheuil, 27.iv.2019, leg. T.J. Wood, TJWC.

Identification key for Belgian Andrena

The 81 confirmed taxa are included, as well as the five species that cannot be confirmed or excluded. The key presented here is based primarily on the works of Schmid-Egger & Scheuchl (1997) and Amiet *et al*. (2010) that cover the larger faunas of Germany, Switzerland, and Austria. Important characters from other works have also been integrated (e.g. Schwenninger, 2009; Praz *et al*., 2019; 2022). Where previous workers have resolved identification issues, their path should be followed, and this key should be recognised as building on these previous publications. However, I have tried to write this key in a way that reflects natural groups (e.g. the subgenera *Andrena* s. str., *Euandrena*, *Taeniandrena*), as learning these groups is a very powerful tool for *Andrena* determination. Where present, these natural groups are indicated. Important illustrations can be found in these works, and should be consulted in conjunction with this key.

Females

1. Scutum and scutellum dorsally with extremely short squamous hairs, clearly shorter than the width of the flagellum, completely covering and obscuring the underlying surface (Fig. 23, subgenus *Lepidandrena*) 2
- Scutum and scutellum without such hairs, hairs present clearly exceeding width of flagellum, if hairs are dense and obscure underlying surface then these hairs are simple, not squamous 3
2. Scutal hairs brown. Tarsal segment 5 of the hind leg elongated and strongly bent .... ***curvungula*** **Thomson**

- Scutal hairs greyish. Tarsal segment 5 of the hind leg not noticeably elongate and only weakly bent ..... ***pandellei* Pérez**

3. Propodeal triangle strongly delineated laterally by a raised carina, internal surface covered by wavy and irregular but strongly raised carinae, the sculpturing of the internal surface usually strongly contrasting the dorsolateral parts of the propodeum (Figs 24-25) 4
- Propodeal triangle delineated laterally by a carina or not, but internal surface never so strongly sculptured, without strongly raised carinae (Figs 26-28). If in doubt, then dorsolateral parts of the propodeum strongly and densely punctate between surface sculpture (Fig. 72) 10

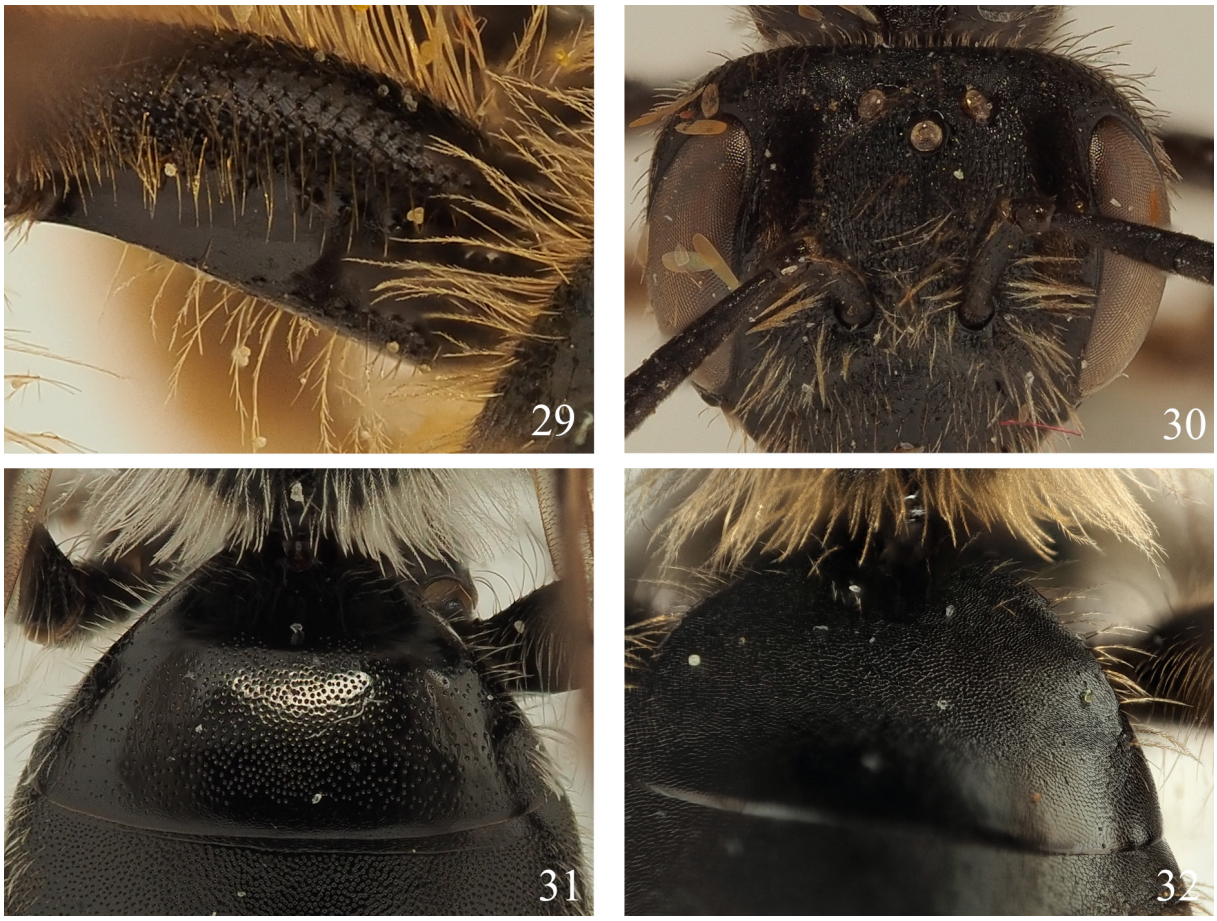
4. Forewing with two submarginal cells ..... ***lagopus* Latreille**

Figs 23-28. 23, *Andrena pandellei* Pérez, 1895, female scutum, lateral view. 24, *A. bimaculata* (Kirby, 1802), female propodeal triangle. 25, *A. haemorrhoa* (Fabricius, 1781), female propodeal triangle. 26, *A. nigroaenea* (Kirby, 1802), female propodeal triangle. 27, *A. helvola* (Linnaeus, 1758), female propodeal triangle. 28, *A. scotica* Perkins, 1916, female propodeal triangle.

- Forewing with three submarginal cells 5
5. Foveae medially constricted. Hind leg with inner tibial spur not noticeably broadened at the base. Terga with terminal fringe orange-red ..... ***haemorrhoa* (Fabricius)**
- Foveae not medially constricted. Hind leg with inner tibial spur strongly broadened at the base. Terga with terminal fringe never orange-red (subgenus *Plastandrena*) 6
6. Terga with dark blue metallic reflections. T4-5 laterally with white hair patches .... ***agilissima* (Scopoli)**
- Terga without metallic reflections. Terga without white hair patches laterally 7
7. Mesosoma predominantly black haired, sometimes with some dark brown hairs intermixed. Tibial scopae predominantly composed of white hairs 8
-Mesosoma predominantly with brown hairs, generally without any black hairs at all. Tibial scopae predominantly composed of orange to brown hairs, never with white hairs 9

The following two taxa cannot be separated in the female sex using morphological characters. Confident determination should be made by association with concurrently active male specimens.

8. Univoltine, flying predominantly in May and June. Typically not found in coastal environments; the dominant species of this species pair in Belgium ..... ***nigrospina* Thomson**
- Bivoltine, flying predominantly in March-April and July-August. Typically found on the coast, the rarer of this species pair in Belgium ..... ***pilipes* Fabricius**
9. Hind tibiae and tarsi orange. Face generally with lighter pubescence. Mesosoma with light brown hairs dorsally and whitish hairs laterally. Faded specimens can be difficult to place. Typically univoltine (March-May) ..... ***tibialis* (Kirby)**
- Hind tibiae and tarsi dark. Face generally with darker pubescence. Mesosoma with dark brown hairs dorsally and light brown hairs laterally. Faded specimens can be difficult to place. Typically bivoltine (March-May and July-August) ..... ***bimaculata* (Kirby)**
10. Posterior face of hind femur with a longitudinal row of raised thorn-like pegs (Fig. 29). Tibial scopa with plumose hairs ..... ***humilis* Imhoff**
- Posterior face of hind femur without such thorn-like pegs. Tibial scopa with plumose hairs or not 11
11. Frons, scutum, scutellum, and metasoma with metallic green reflections. Clypeus domed, strongly shagreened and dull, without metallic reflections, thus contrasting metallic green colouration of lower paraocular areas ..... ***viridescens* Viereck**
- Metasoma without metallic green reflections. If some metallic reflections can be seen, then body length clearly greater than 8 mm 12
12. Small species with body length under 9 mm. Metasoma entirely dark 13
- Body length greater than 9 mm or metasoma with red markings 26
13. Hind tibiae and tarsi orange ..... ***tarsata* Nylander**
- Hind tibiae and tarsi dark 14
14. Foveae long, dorsally extent reaching a line parallel to the hind margin of the lateral ocelli, foveae deeply impressed (Fig. 30). Propodeal triangle not laterally delineated by carinae, internal surface weakly elevated, with irregular raised rugae that do not cover the entire area. Terga laterally with loose, white interrupted hairbands ..... ***coitana* (Kirby)**
- Foveae shorter, not reaching level of the lateral ocelli dorsally, only weakly impressed. Propodeal triangle clearly delineated laterally by carinae, internal surface evenly and regularly covered by fine network of raised rugae. Terga with lateral hairbands or not (majority of members of the subgenus *Micrandrena*) 15
15. Disc of T1 smooth and shining, without microreticulation, surface deeply and densely punctate (Fig. 31) 16
- Disc of T1 weakly to strongly microreticulate, surface weakly to strongly punctate 17
16. Foveae strongly constricted and narrowed ventrally. Punctures on disc of T1 extend onto marginal area. Terminal fringe dark brown ..... ***nana* (Kirby)** (extinct)



Figs 29-32. 29, *Andrena humilis* Imhoff, 1832, female hind femur, posterior side, dorsal view. 30, *A. coitana* (Kirby, 1802), female foveae, dorsal view. 31, *A. nana* (Kirby, 1802), female T1, dorsal view. 32, *A. strohmella* Stöckhert, 1928, female T1, dorsal view.

- Foveae not strongly constricted and narrowed ventrally, equal width throughout. Punctures of T1 limited to disc, not extending onto marginal area. Terminal fringe golden-orange ..... ***floricola* Eversmann** (not confirmed from Belgium)

17. T1 laterally with slightly raised corners, visibly projecting and disrupting rounded profile when viewed dorsally (Fig. 32). Clypeus slightly flattened centrally, with clear impunctate mid-line between large and well defined clypeal punctures. Terga 2-3 centrally impunctate, laterally with large punctures with raised margins (crater punctures) ..... ***strohmella* Stöckhert**
- T1 laterally without such raised projections, in dorsal view evenly rounded. Clypeus not noticeably flattened, without an unambiguously defined impunctate mid-line, though in some species a weak impunctate mid-line may be formed. Terga 2-3 without strong contrast between dorsal and lateral punctation 18

18. T2(3-4) laterally without gradulus (raised ridge which runs under the apical edge of the preceding tergum, emerging laterally). Tergal margins strongly depressed (Fig. 33)..... 19
- T2(3-4) laterally with gradulus present (e.g. Figs 37-38). Tergal margins depressed or not 20

19. Depressed tergal margins polished and shiny, clearly shinier than shagreened tergal discs. In dorsal view, lateral hairs at the base of the marginal area of T2 longer, erect, projecting at a 45° angle, breaking profile of metasoma laterally. Margin of T2 comparatively strongly depressed ..... ***semilaevis* Pérez**
- Depressed tergal margins shagreened, similar to and not strongly contrasting shagreened tergal discs. In dorsal view, lateral hairs at the base of the margin area of T2 shorter, flat, not projecting, almost parallel with lateral profile of metasoma. Margin of T2 comparatively weakly depressed ..... ***anthrisci* Blüthgen** (not confirmed from Belgium)

20. Disc of T2(3) with clear punctures visible against the underlying shagreen (Figs 34-35) 21

- Disc of T2(3) essentially impunctate; some weak punctures may be visible laterally but these are dispersed 23

21. T1 with marginal area thickened and impunctate, visibly raised and standing out from disc (Fig. 34); marginal area with finer shagreenation than disc, therefore shining more brightly .... ***falsifica* Perkins**

- T1 with marginal area with slightly depressed or flat, not visibly raised and standing out from disc; marginal area without noticeably different sculpturing than disc 22

22. Tergal margins noticeably depressed, particularly on terga 3-4. Tergal discs very densely punctate, punctures separated by <0.5-1 puncture diameter, in some places confluent, underlying surface

Figs 33-38. 33, *Andrena anthrisci* Blüthgen, 1925, female terga, dorsal view. 34, *A. falsifica* Perkins, 1915 female terga, dorsal view. 35, *A. alfkenella* Perkins, 1914, female terga, dorsal view. 36, *A. pusilla* Pérez, 1903, female terga, dorsal view. 37, *A. minutula* (Kirby, 1802), female terga, dorsal view. 38, *A.minutuloides* Perkins, 1914, female terga, dorsal view.

matt. Propodeal triangle with internal rugosity becoming weak posteriorly, very weakly laterally delineated. Clypeus weakly shagreened, apical third shiny ..... ***niveata* Friese**

- Tergal margins not noticeably depressed, flat. Tergal discs moderately densely punctate, punctures separated by 1 puncture diameter, never confluent, underlying surface weakly shining (Fig. 35). Propodeal triangle uniformly rugose and strongly delineated. Clypeus uniformly matt ..... ***alfkenella* Perkins** (not confirmed from Belgium)

23. Clypeus rounded and weakly domed, sparsely and irregularly punctate, punctures separated by 1-4 puncture diameters, particularly sparse centrally. Scutum finely and sparsely punctate, punctures separated by 2-3 puncture diameters, underlying surface uniformly dull. Foveae not narrowed below, parallel sided, of uniform width throughout ..... ***subopaca* Nylander**

- Clypeus not noticeably domed, regularly and densely punctate, punctures separated by 1-2 puncture diameters. Scutum sparsely to densely punctate, underlying surface dull to shiny. Foveae variable, of uniform width to narrowed ventrally 24

24. Tergal margins progressively more depressed, most clearly on T4 (Fig. 36). Scutum finely and sparsely punctate, punctures separated by 2-3 puncture diameters, underlying surface uniformly dull. Foveae weakly narrowed ventrally ..... ***pusilla* Pérez**

- Tergal margins not noticeably depressed (Figs 37-38). Scutum densely punctate with strong punctures, punctures separated by 1-2 puncture diameters, underlying surface dull to shiny. Foveae variable, of uniform width to narrowed ventrally 25

25. Scutum and scutellum strongly and densely punctate, punctures separated by <1-1 puncture diameter, underlying surface dull (1st generation) to weakly shining (2nd generation). In fresh specimens (beware abrasion) tergal margins with strong lateral hair fringes (Fig. 37). Foveae of uniform width throughout ..... ***minutula* (Kirby)**

- Scutum and scutellum strongly but slightly randomly punctate, punctures separated by 1-2 puncture diameters, underlying surface weakly shining (1st generation) to strongly shining (2nd generation). Tergal margins with extremely weak lateral hair fringes with a few hairs touching (1st generation, Fig. 38) or all hairs separated (2nd generation). Foveae slightly narrowed ventrally ..... ***minutuloides* Perkins**

26. Metasomal terga with discs extensively red-marked (Fig. 39) 27

- Metasomal terga with discs not extensively red-marked. There may be some red colouration present on the tergal margins 34

27. Tibial scopae strongly plumose ventrally (Fig. 40) 28

- Tibial scopae with simple hairs 29

28. Large (14-16 mm). Posterior face of hind femur with conspicuous latitudinal carina .... ***hattorfiana* (Fabricius)** (red form)

- Smaller (9-10 mm). Posterior face of hind femur evenly rounded ..... ***marginata* Fabricius** (extinct)

29. T2 with long erect hairs that are as long as those on the mesosoma. T1 shagreened with scattered rough punctures ..... ***trimmerana* (Kirby)** (red form)

- T2 without long hairs, at most T1 with long hairs. Punctation of T1 otherwise or surface smooth 30

30. T2 strongly shagreened, matt, with obscure and scattered punctures ..... ***rosae* Panzer** (red form)

- T2 shiny, densely punctured 31

31. Body length 10 mm or greater 32

- Body length less than 10 mm 33

32. Clypeus shiny with sparse punctures, punctures clearly separated by a distance greater than their diameter ..... ***florea* Fabricius**

- Clypeus dull, very densely punctate, punctures separated by a distance equal to or less than their diameter ..... ***schencki* Morawitz**

33. Scutum with punctation denser and more regular, punctures separated by 1 puncture diameter. Clypeus laterally (area adjacent to mandibles) very densely punctate, puncture separated by 0.5 puncture diameters (Fig. 41). Facial foveae slightly narrowed ventrally, here narrower than their dorsal breadth. On average slightly larger, 7-9 mm ..... ***labiata* Fabricius** (common and widespread, polylectic)

- Scutum less densely punctured, punctures more irregular, separated by 1-2 puncture diameters. Clypeus laterally with sparse punctures, punctures separated by 1-2 puncture diameters (Fig. 42). Facial

Figs 39-44. 39, *Andrena rosae* Panzer, 1801, (light form), female terga, dorsal view. 40, *A. hattorfiana* (Fabricius, 1775), scopal hairs. 41, *A. labiata* Fabricius, 1781, female clypeus. 42, *A. potentillae* Panzer, 1809, female clypeus. 43, *A. ovatula* (Kirby, 1802), female terminal fringe. 44, *A. afzeliella* (Kirby, 1802), female terminal fringe.

foveae slightly broadened ventrally, here broader than their dorsal breadth. On average slightly smaller, 6-7 mm .....***potentillae* Panzer** (very rare, specialised on *Potentilla*)

34. Large (14-16 mm). Posterior face of hind femur with conspicuous latitudinal carina. Tibial scopae strongly plumose ventrally .....***hattorfiana* (Fabricius)** (dark form)

- Typically smaller. Posterior face of hind femur without conspicuous latitudinal carina. Tibial scopae plumose or not 35

35. Clypeus strongly flattened over almost its entire area (subgenus *Taeniandrena*) 36

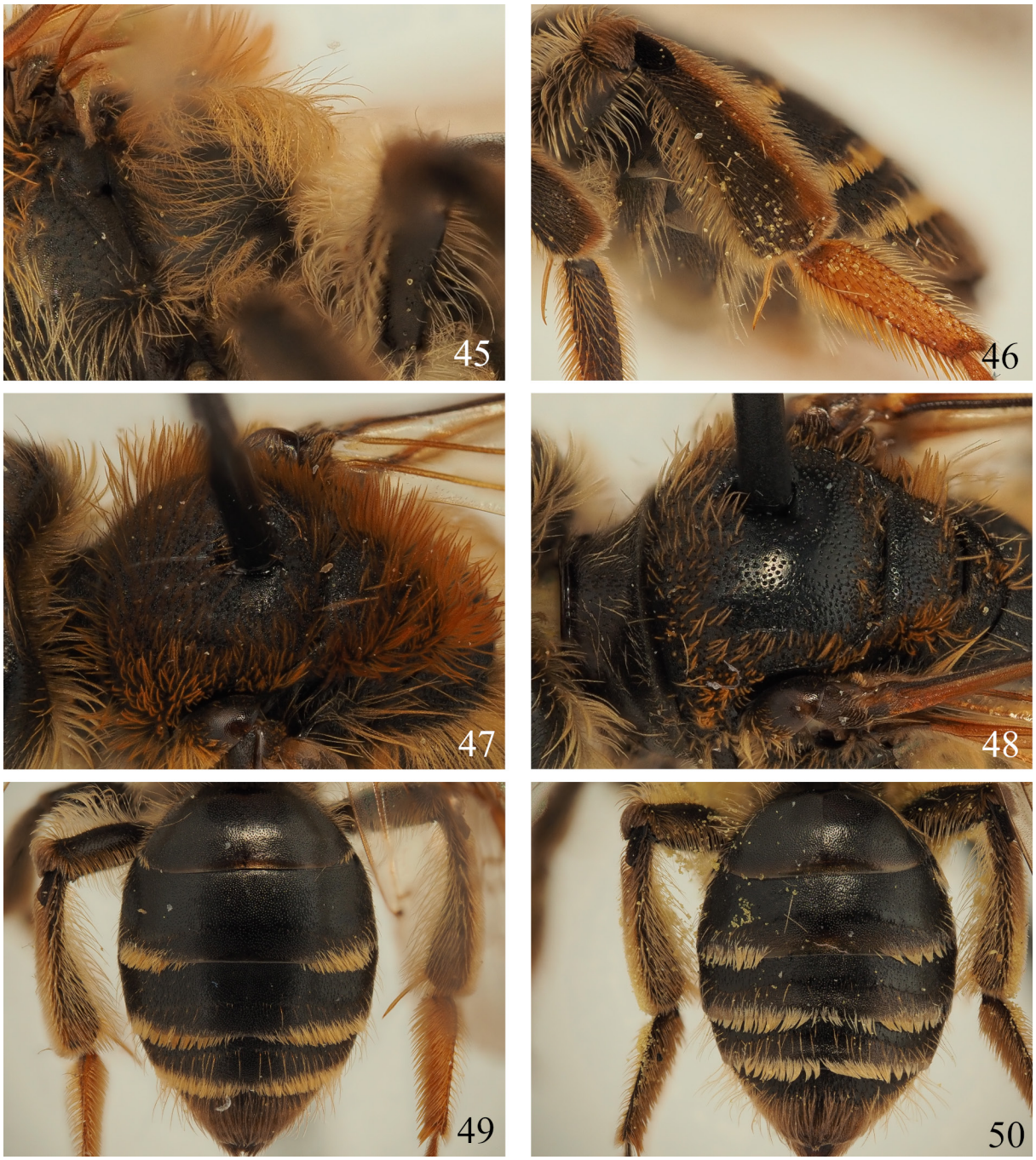
- Clypeus not strongly flattened 42

Members of the subgenus *Taeniandrena* are highly challenging to separate, and require experience and confidently determined reference material.

36. Clypeus medially slightly concave, strongly shagreened with shallow and obscure punctures. Pygidial plate apically emarginate ..... ***lathyri* Alfken**
- Clypeus without medial concavity, punctures weak to strong. Pygidial plate apically rounded, never emarginate 37
37. T1 comparatively strongly and densely punctate, punctures comparatively clearly visible in shagreenation, most clearly visible on the declivity (sloping, anterior part of T1), punctures separated by <1 puncture diameter. Remaining terga comparatively densely punctate, with large punctures. Tergal hairbands interrupted on T2-3. Terminal fringe orange ..... ***wilkella* (Kirby)**
- T1 impunctate or weakly and obscurely punctate. Tergal hairbands interrupted or complete. Terminal fringe orange or dark brown 38
38. Terga essentially impunctate, with only shallow and obscure punctures. Pubescence of scutum and scutellum bright orange in fresh individuals. Hind tibiae always orange. Terminal fringe orange ..... ***russula* Lepeletier**
- Terga with visible punctures, density variable. Pubescence of scutum and scutellum variable. Hind tibiae orange or not. Terminal fringe orange or dark brown 39
39. Apical hairbands of T2-3 complete in fresh individuals – beware abraded specimens. Terminal fringe dark brown, greyish white to yellowish white, usually not uniformly golden. Typically smaller, 8-10 mm (common and widespread) 40
- Apical hairbands of T2-3 interrupted in fresh individuals. Terminal fringe usually uniformly golden. Typically larger, 9-12 mm (extremely rare) 41
40. Terminal fringe and hairs flanking the basitibial plate of the hind tibia dark brown (Fig. 43). Dorsal part of the tibial scopa usually with some dark hairs basally. Scutum medially with short black hairs underlying longer greyish pubescence. Slightly larger, body length 9–10 mm. Bivoltine, typically March-April and June-July ..... ***ovatula* (Kirby)**
- Terminal fringe and hairs flanking the basitibial plate of the hind tibia light, from greyish to yellowish white or orange, never dark brown (Fig. 44). Dorsal part of the tibial scopa never with dark hairs basally, scopal hairs uniformly golden. Scutum with yellowish pubescence, without underlying short black hairs medially. Bivoltine, typically mid-May to June and July-August ..... ***afzeliella* (Kirby)**

The following two species are extremely difficult to separate in the female sex.

41. Pubescence on scutum slightly longer, nearly twice as long as width of antennae, punctation on terga on average less dense and less visible ..... ***intermedia* Thomson** (not confirmed from Belgium)
- Pubescence on scutum shorter. Punctation on terga on average denser, punctures more visible ..... ***gelriae* van der Vecht** (extinct)
42. Propodeal corbicula forming a basket, with strong complete fringe of hairs completely encircling the lateral face of the propodeum, the surface of which is glabrous, without hairs (Fig. 45, subgenus *Simandrena*) 43
- Propodeal corbicula not forming a strong basket, or if so, then lateral face of the propodeum with long, projecting hairs, not glabrous 46
43. Tibial scopa with short hairs, dorsally these hairs not greatly exceeding the width of a lateral ocellus (Fig. 46). Metasoma with punctures on tergal discs dense medially, becoming sparse laterally ... 44
- Tibial scopa with long hairs, very clearly greatly exceeding the width of a lateral ocellus. Metasoma with consistently dense punctures, not becoming sparser laterally 45
44. Scutum medially shagreened and dull (Fig. 47). In fresh individuals, tergal hairbands short, not noticeably surpassing the apex of the tergal margins (Fig. 49). Hind tibiae and basitarsis usually orange, but can be entirely dark ..... ***dorsata* (Kirby)**
- Scutum medially polished and shiny (Fig. 48). In fresh individuals, tergal hairbands long, clearly surpassing the apex of the tergal margins (Fig. 50). Hind tibiae and basitarsis usually dark, occasionally lightened orange-brown ..... ***propinqua* Schenck**
45. Terga strongly and densely punctured, underlying surface smooth and shining. Clypeus bright, with pattern of raised longitudinal ridges crossing surface. Terminal fringe orange .... ***combinata* (Christ)** (extinct)



Figs 45-50, *Andrena dorsata* (Kirby, 1802), 45, female propodeal corbicula, lateral view. 46, female hind tibia. 47, female scutum, lateral view. 49, female terga, dorsal view; *A. propinqua* Schenck, 1853. 48, female scutum, lateral view. 50, female terga, dorsal view.

- Terga weakly and obscurely punctured, underlying surface shagreened and dull. Clypeus dull, without raised ridges. Terminal fringe dark brown ..... ***confinis* Stöckhert**

46. Hind tibiae and basitarsi orange, tibial scopa strongly plumose, particularly ventrally (Fig. 51). Terga smooth and shiny, T2-4 strongly and densely punctate, punctures separated by 1 puncture diameter ..... ***fulvago* (Christ)**

- Hind tibiae and basitarsi either dark, or if orange then without plumose hairs. Tergal shiny or not, densely punctate or not 47

47. Facial foveae ‘drop-shaped’, occupying 1/3rd of area between the lateral ocellus and compound eye dorsally AND strongly narrowed ventrally, here less than half of dorsal breadth (Fig. 52, subgenus *Euandrena*) 48

- Facial foveae not of this form, either clearly occupying more than ½ the area between the lateral ocellus and compound eye dorsally OR occupying less than ½ this area but not strongly narrowed ventrally (Figs 53-54) 53

48. Hind tibiae and basitarsi orange. Terga shagreened, with fine, obscure punctures ..... ***ruficrus*** **Nylander**

- Hind tibiae and basitarsi dark. Terga shagreened or shiny, with clearly visible punctures or not 49

49. Clypeus medially with a longitudinal impression (take care, *A. rufula* can have hints of a weak longitudinal impression) 50

- Clypeus without a longitudinal impression, evenly domed 51

Figs 51-56. 51, *Andrena fulvago* (Christ, 1791), female hind tibia. 52, *A. bicolor* Fabricius, 1775, female foveae, dorsal view. 53, *A. helvola* (Linnaeus, 1758), female foveae, dorsal view. 54, *A. nitida* (Müller, 1766), female foveae, dorsal view. 55, *A. angustior* (Kirby, 1802), female terga, dorsal view. 56, *A. fulvata* Stöckhert, 1930, female terga, dorsal view.

50. Marginal areas of terga, particularly T2, strongly depressed and polished, shining (Fig. 55) ..... ***angustior* (Kirby)**
- Marginal areas of terga only slightly depressed, shagreened and dull (Fig. 56) ..... ***fulvata* Stöckhert**
51. Facial hairs extensively brown, with only a few isolated black hairs along the compound eye. Pubescence of mesonotum brown with intermixed slightly shorter black hairs, mesepisternum without black hairs. Disc of T1 weakling shining, between disc and marginal area with several subtle longitudinal impressions similar to those than can be found in the unrelated *A. vaga* (see below) ..... ***fulvida* Schenck**
- Without this combination of characters; facial hair either extensively black, mesonotum without intermixed short black hairs, or disc of T1 without longitudinal impressions 52

Figs 57-62. *Andrena denticulata* (Kirby, 1802), 57, female terga, dorsal view. 58, female hind tibia, lateral view; *A. flavipes* Panzer, 1799. 59, female terga. 60, female hind tibia, lateral view. 61, *A. fulva* (Müller, 1766), female terga, dorsal view. 62, *A. helvola* (Linnaeus, 1758), female terga, dorsal view.

52. Facial hairs extensively black, mesepisternum laterally usually with extensive black pubescence ..... ***bicolor* Fabricius** aggregate
- Facial hairs predominantly pale, with dark hairs restricted to lateral parts of the face alongside the inner margin of the compound eyes. Mesepisternum always with entirely pale hairs, never with black hairs ..... ***rufula* Schmiedeknecht**
53. Scutum and scutellum with extensive uniformly grey pubescence, metasoma lacking tergal hairbands 54
- Scutum and scutellum without extensive areas of uniformly grey pubescence. If in doubt, then terga with obvious hairbands 55
54. Scutum medially with a clear band of black hairs, separating anterior and posterior patches of grey hairs. Area between disc and marginal area of T1 without longitudinal impressions .... ***cineraria* (Linnaeus)**
- Scutum entirely grey haired, without black hairs. Area between disc and marginal area of T1 with several longitudinal impressions ..... ***vaga* Panzer**
55. Propodeal triangle with internal surface largely smooth, with only short and fine rugae basally; propodeal triangle therefore contrasting the more coarsely sculptured dorsolateral parts of the propodeum (Figs 27-28) 56
- Internal surface of propodeal triangle with clearly raised wrinkles in basal half, structurally therefore not strongly differentiated from dorsolateral parts of the propodeum (Fig. 26) 74
56. Terga with thick, dense apical hairbands that obscure the underlying surface, these hairbands strongly contrasting the tergal discs which are much less hirsute (Fig. 57). Pronotum with strong humeral angle. Hind tibia clearly expanded apically, much broader here than basally, thus triangular (Fig. 58). Active only in the summer (June-September, subgenus *Cnemidandrena*) 57
- Terga without dense apical hairbands; when terga are hairy, hairs are more evenly distributed over the discs and the marginal areas, or forming long hair tufts on tergal discs (Figs 61-62; 65-68). If with strong tergal hairbands (Fig. 59) then pronotum without a strong humeral angle, or if with a humeral angle then active only in the spring. Hind tibia not noticeably expanded apically (Fig. 60) 59
57. Scutum with anteriorly and posteriorly with greyish-yellow pubescence, medially with extensive black pubescence. Associated with Asteraceae ..... ***denticulata* (Kirby)**
- Scutum with uniformly brownish pubescence, without black hairs 58
58. Outer surface of galea polished and shiny. Face with light pubescence. Associated with Ericaceae ..... ***fuscipes* (Kirby)**
- Outer surface of galea shagreened and dull. Face with black pubescence. Associated with many different flowering plants ..... ***nigriceps* (Kirby)**
59. Trochanter of the hind leg with a dense and upwards curved tuft of hairs (Fig. 63, flocculus). Pygidial plate with elevated triangular area medially, this area with granular punctures, the depressed marginal areas with fine microsculpture (subgenus *Andrena* s. str.) 60
- Trochanter of hind leg with only a weak tuft of sparse, short hairs, not forming a complete flocculus (Fig. 64). Pygidial plate without raised internal area or depressed marginal areas 71
60. Terga densely covered with long hairs, in fresh specimens these obscuring the underlying surface (Fig. 61) 61
- Terga less thickly haired, sometimes with hair tufts on T1-2, but these not obscuring the underlying surface (Figs 62; 65-68) 63
61. Hind tibiae orange. Terga predominantly black-haired, sometimes with light hairs on T1 ..... ***clarkella* (Kirby)**
- Hind tibiae dark. Tergal pubescence never predominantly black, either reddish-orange or grey 62
62. Process of labrum triangular. Terga 1-3 or sometimes 1-5 grey-haired ..... ***nycthemera* Imhoff**
- Process of labrum trapezoidal. Terga 1-5 with extensive reddish-orange pubescence (Fig. 61) ..... ***fulva* (Müller)**
63. Marginal areas of T2-4 very wide, occupying ¾ of each segment (Fig. 65) ..... ***synadelpha* Perkins**
- Marginal areas of T2-4 never occupying more than ½ of each segment, usually covering only 1/3rd (Figs 62; 66-68) 64

Figs 63-68. 63, *Andrena helvola* (Linnaeus, 1758), female flocculus, ventral view. 64, *A. rosae* Panzer, 1801, female flocculus, ventral view. 65, *A. synadelpha* Perkins, 1914, female terga, dorsal view. 66, *Andrena fucata* Smith, 1847, female terga, dorsal view. 67, *A. varians* (Kirby, 1802), female terga, dorsal view. 68, *A. lapponica* Zetterstedt, 1838, female terga, dorsal view.

64. Face with entirely pale hairs, at most with a few scattered dark hairs along the inner margin of the compound eye 65
- Face with extensive black hairs, particularly around the antennal insertions and along the inner margin of the compound eye 68

65. Tibial scopa dorsally with dark hairs, ventrally with white hairs .....***varians* (Kirby)** (light form)
- Tibial scopa with uniformly light hairs, whitish or golden 66

66. Terga sparsely haired, with at most weak hair tufts on T1-2 (Fig. 66). Terga finely shagreened and thus weakly shining. Flying later in the year (June-August), associated with shrubs, particularly *Rubus* ..... ***fucata* Smith**

- Terga typically with long hairs, in fresh specimens with clear and dense hair tufts on T1-2 (Fig. 62). Abraded or older specimens may lack such hair tufts, in which case use the following characters: Terga strongly shagreened, dull. Flying earlier in the year (March-May), associated with flowering trees 67

67. Basitarsis of hind tibia parallel sided, not converging apically ..... ***helvola* (Linnaeus)**

- Basitarsis of hind tibia broader basally, narrower apically, therefore converging apically (Fig. 17) ..... ***mitis* Schmiedeknecht**

68. Face entirely black haired, without any pale hairs. Terga basally (T1-2) with orange-brown hairs, apically (T3-4) with extensive and strongly contrasting black hairs (Figs 67-68). Species not typically associated with *Salix* 69

- Face with at least some pale hairs, particularly around the antennal insertions (Figs 5-6). Terga without extensive areas with black hairs, generally with mixture of predominantly yellowish to brownish hairs on T1-4 (Fig. 8). Species associated with *Salix* 70

69. Terga with orange-brown hairs on T1-2 denser and more extensive (Fig. 67). Clypeus apically with small and narrow shiny impunctate longitudinal area. Associated with flowering trees, typically *Prunus* ..... ***varians* (Kirby)** (dark form)

- Terga with orange-brown hairs on T1-2 sparse (Fig. 68). Clypeus apically with shiny impunctate area larger, longer and broader. Associated with *Vaccinium* ..... ***lapponica* Zetterstedt**

70. Smaller, 10-11 mm. Terminal fringe dark brown ..... ***praecox* (Scopoli)**

- Larger, 11-14 mm. Terminal fringe black (Fig. 8) ..... ***apicata* Smith** and ***batava* Pérez** (these two taxa cannot currently be adequately separated in the female sex; association with males must be made)

71. Hind tibiae golden-orange. Clypeus medially with a clearly raised longitudinal impunctate area, this area smooth and shining, strongly contrasting the remaining parts of the clypeus which are densely punctate ..... ***ferox* Smith, 1847**

- Hind tibiae dark. Clypeus without such a raised shiny impunctate area 72

72. Metasomal terga with short hairs, most clearly seen in profile on T2-3 with hairs not exceeding width of flagellum (Fig. 69) ..... ***rosae* Panzer** (dark form)

- Metasomal terga with extensive and abundant long hairs, most clearly seen in profile on T2-3 with hairs clearly exceeding width of flagellum (Fig. 70) 73

These two taxa cannot be consistently separated using morphological characters when *A. trimmerana* presents its dark form. Knowledge of local phenology, and association with males can aid identification, but certainty can only be achieved with molecular techniques. Indicative characters are given here, but these cannot be used in isolation.

73. Tibial scopa in fresh specimens dark dorsally and golden ventrally, but this can be ambiguous and fade to silver in older specimens or pinned material. Facial hair can be dark, particularly in the spring generation, the summer generation usually has lighter facial hair. Bivoltine, usually flying March-May and July-August, with phenology depending on local conditions ..... ***trimmerana* (Kirby)** (dark form)

- Tibial scopa in fresh specimens usually dark dorsally and silver ventrally. Usually with light brown facial hair. Usually univoltine, flying April to mid-June, with sporadic emergence in August and September ..... ***scotica* Perkins**

74. Lateral face of the propodeum covered in large, start-shaped wrinkles (Fig. 71). Clypeus with dense network of raised latitudinal carinae. Body length 10 mm ..... ***proxima* (Kirby)**

- Lateral face of the propodeum without such star-shaped wrinkles. Clypeus without raised latitudinal carinae. Most with larger body size 75

75. Mesepisternum and dorsolateral parts of the propodeum with dense and distinct punctures (Fig. 72). Terga densely and uniformly punctate, punctures separated by 1 puncture diameter. Process of the labrum deeply emarginate medially ..... ***labialis* (Kirby)**

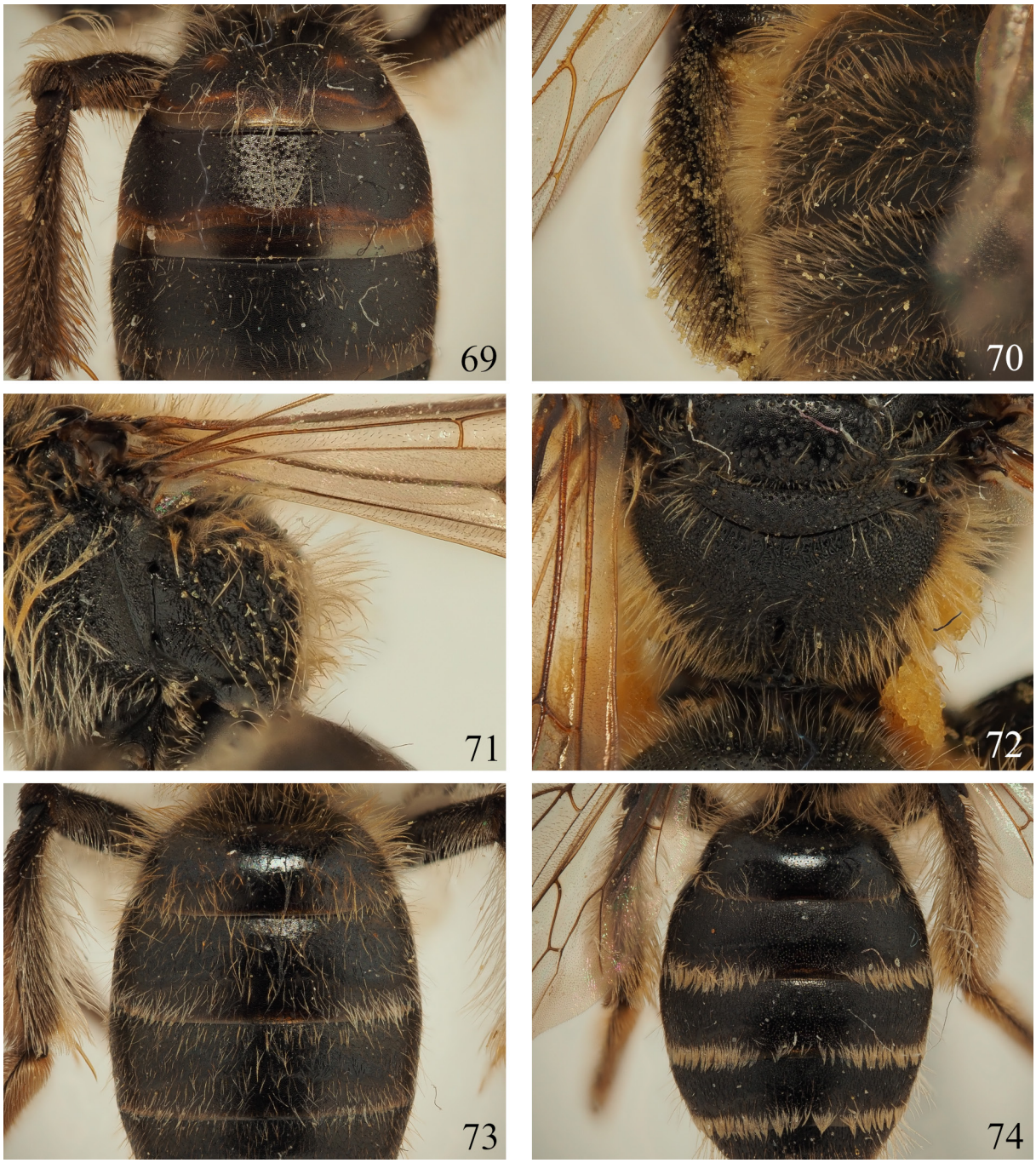
- Mesepisternum and dorsolateral parts of the propodeum not distinctly punctate, sometimes with superficially raised rugae that can give the impression of punctures; if so, then ‘punctures’ clearly

separated by more than 1 puncture diameter. Terga punctate or not, process of the labrum emarginate or not 76

76. Process of the labrum narrow, more or less triangular, at most as broad as long. Pygidial plate with strongly elevated area medially, lateral parts therefore appearing depressed (subgenus *Leucandrena*) 77

- Process of the labrum clearly broader than long. Pygidial plate without a clearly elevated part medially 79

77. Scutum medially with reduced shagreenation, here smooth and shiny. Terga laterally often red marked or reddish. Terga without clear apical hairbands ..... ***ventralis* Imhoff**



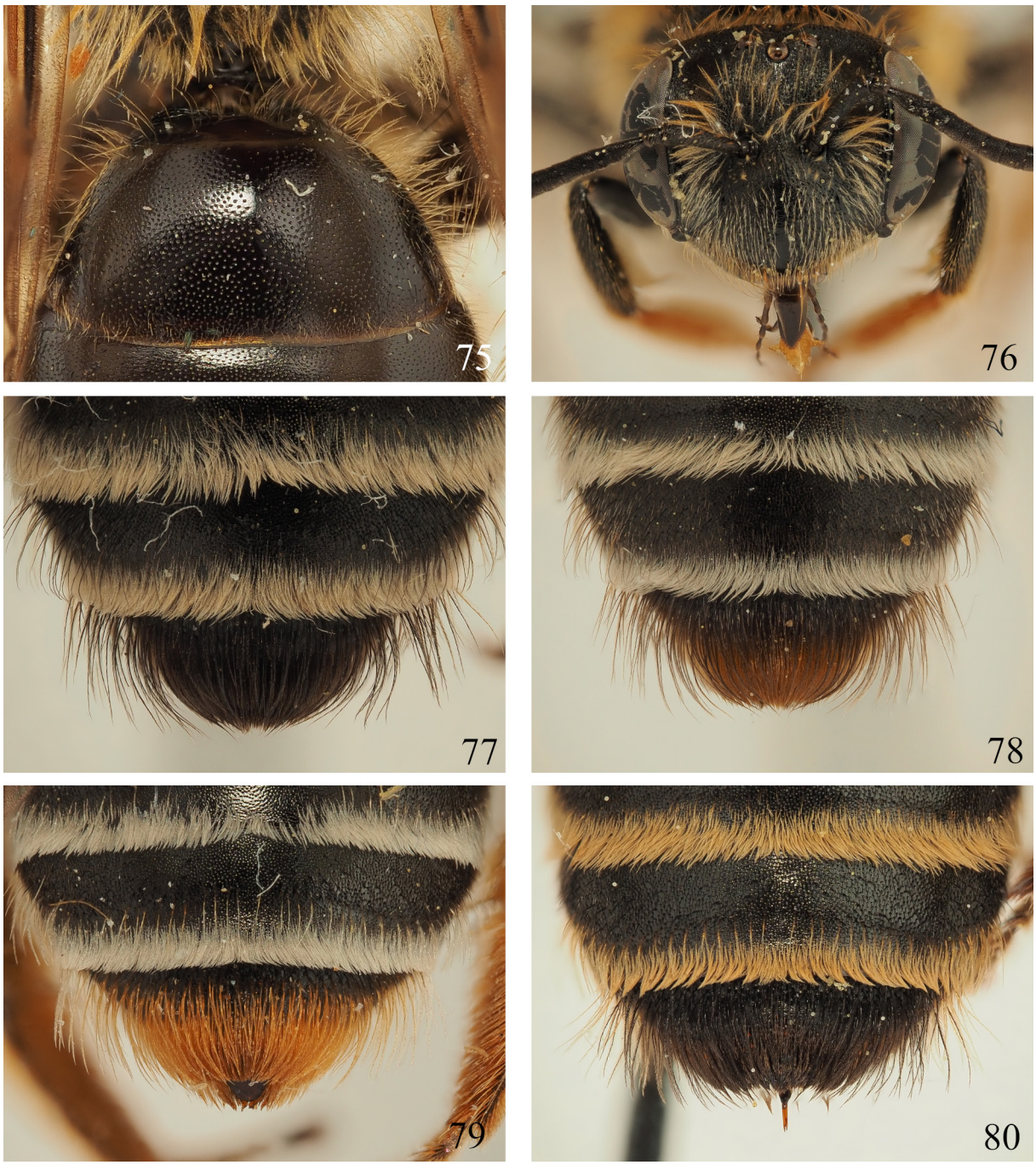
Figs 69-74. 69, *Andrena rosae* Panzer, 1801, female terga, dorsal view. 70, *A. scotica* Perkins, 1916, female terga, lateral view. 71, *A. proxima* (Kirby, 1802), female propodeum, lateral view. 72, *A. labialis* (Kirby, 1802), female propodeum, dorsal view. 73, *A. barbilabris* (Kirby, 1802), female terga, dorsal view. 74, *A. argentata* Smith, 1844; female terga, dorsal view.

- Scutum weakly or strongly but uniformly shagreened, without contrasting smooth and shining area medially. Terga never with red markings. Terga with clear apical hairbands, dense or fine 78

78. Discs of T1-3 with sparse and obscure punctures, punctures separated by 2-3 puncture diameters. Scutum strongly shagreened, dull (Fig. 73) ..... ***barbilabris* (Kirby)**

- Discs of T1-3 strongly punctured, punctures separated by 1 puncture diameter. Scutum less strongly shagreened, weakly shining (Fig. 74) ..... ***argentata* Smith**

79. Inner spur of hind tibia broadened submedially. T1 densely punctate with characteristic longitudinal impunctate line medially, this broadening over the transition from the disc to the declivity (Fig. 75) ..... ***polita* Smith**



Figs 75-80. 75, *Andrena polita* Smith, 1847 female T1, dorsal view. 76, *A. chrysosceles* (Kirby, 1802), female face, frontal view; *A. gravida* Imhoff, 1832. 77, female terminal fringe, dark form. 78, female terminal fringe, light form. 79, *A. chrysopyga* Schenck, 1853, female terminal fringe. 80, *A. flavipes* Panzer, 1799, female terminal fringe.

- Inner spur of hind tibia not broadened, parallel sided. T1 without this longitudinal impunctate midline 80

80. Clypeus strongly punctured, punctures typically separated by <0.5 puncture diameters. Head more or less rounded, as long as broad. Body size large (11-15 mm, subgenus *Melandrena*) 81

- Clypeus less strongly punctured, punctures typically separated by at least 1 puncture diameter. Head short and broad, clearly broader than long (Fig. 76). Body size smaller (8-10 mm, subgenus *Notandrena*) 88

81. Marginal area of T2-3 densely punctured. Tibial scopa with hairs orange-red. T3-4 with dense apical unbroken hairbands of whitish or yellowish hairs 82

Figs 81-86. 81, *Andrena nigroaenea* (Kirby, 1802), female hind tibia, lateral view. 82, *A. nitida* (Müller, 1766), female T1, dorsal view. 83, *A. thoracica* (Fabricius, 1775), female T1, dorsal view. 84, *A. nitida* (Müller, 1766), female hind tibia, lateral view. 85, *A. limata* Smith, 1853, female hind tibia, lateral view. 86, *A. assimilis* Radoszkowski, 1876, female T1, dorsal view.

- Marginal area of T2-3 with scattered punctures. Terga without dense unbroken hairbands. Tibial scopa with dark hairs at least dorsally, if entirely light then follow hair band character 84

82. Posterior face of hind femur with clear latitudinal carina. If in doubt, if face is predominantly dark haired, go here 83

Posterior face of hind femur rounded, without latitudinal carina. Terminal fringe usually dark brown to black (Fig. 77), can sometimes show a mixture of brown and reddish hairs, never uniformly golden; always at least some dark hairs present (Fig. 78). Face always predominantly pale-haired ..... ***gravida* Imhoff**

83. Terminal fringe composed entirely of golden hairs, without a single dark hair present (Fig. 79). Face with predominantly pale hairs. Larger, 12-14 mm. Associated with calcareous grassland ..... ***chrysopyga* Schenck** (extinct)

- Terminal fringe with dark hairs (Fig. 80). Aberrant specimens can display a mixture of brown to reddish hairs, but always at least some dark hairs present. Face predominantly dark haired. Smaller, 11-12 mm. Ubiquitous throughout Belgium ..... ***flavipes* Panzer**

84. Tibial scopa composed of reddish-yellow hairs (Fig. 81). T2-3 with long yellowish hairs ..... ***nigroaenea* (Kirby)**

- Tibial scopa entirely dark or dorsally with dark hairs (Figs 84-85). T2-3 either dark haired or with sparse short hairs 85

85. T1 with dense punctures, punctures separated by 1 puncture diameter (Fig. 82) 86

- T1 with punctures sparse to almost absent, puncture separated by at least 2 puncture diameters (Figs 83; 86) 87

86. Tibial scopa dorsally dark, ventrally white (Fig. 84). Univoltine (April-June ..... ***nitida* (Müller)**

- Tibial scopa uniformly black (Fig. 85). Bivoltine (April-June, July-September) .... ***limata* Smith** (not confirmed from Belgium)

87. T1 with punctures separated by 2 puncture diameters (Fig. 83), underlying surface smooth and shining. Mesepisternum always with black hairs. Tibial spurs of hind leg black ..... ***thoracica* (Fabricius)** (extinct)

- T1 with punctures very sparse, clearly separated by more than 2 puncture diameters, underlying surface shagreened, weakly shining to dull (Fig. 86). Mesepisternum with hairs light brown to black. Tibial spurs of hind leg yellowish ..... ***assimilis* Radoszkowski**

88. Hind tibiae orange. Scutum with midline weakly to not impressed medially. Flying in the spring (April-June) ..... ***chrysosceles* (Kirby)**

-Hind tibiae dark. Scutum with midline strongly impressed medially. Flying in the summer (July-August) ..... ***nitidiuscula* Schenck**

Males

1. Clypeus yellow-marked (Figs 87; 89-92) 2

- Clypeus entirely dark 13

2. Disc of T2 entirely red-marked, at most with small lateral dark flecks. T1 and T3 usually at least partially red-marked 3

- T1-3 with at most tergal margins red-marked, without red colouration on tergal discs 6

3. Lower paraocular areas black, without yellow colouration ..... ***marginata* Fabricius** (extinct)

- Lower paraocular areas with yellow markings (Fig. 87) 4

4. Body size large, 11-13 mm. Penis valves strongly broadened medially. Mandibles long and crossing apically when closed ..... ***schencki* Morawitz**

- Smaller, body size 5-9 mm. Penis valves not strongly broadened medially. Mandibles not noticeably elongate 5

5. Gonostyli strongly bent apically, converging in front of the apex of the penis valves before sharply diverging and slightly thickening apically (Fig. 88). Scutum densely punctate, punctures separated by 1-1.5 puncture diameters. Larger, 7-9 mm ..... ***labiata* Fabricius** (common and widespread)

- Gonostyli not strongly bent apically, converging more gently in front of the apex of the penis valves, here parallel sided. Scutum sparsely punctate. Smaller, 5-7 mm ..... ***potentillae* Panzer** (very rare)

6. Body with metallic green reflections. Antennae ventrally lightened orange (Fig. 89). Small, 6-7 mm ..... ***viridescens* Viereck**
- Body dark, without metallic reflections. Most larger than 7 mm 7
7. Disc of T1 strongly shagreened and matt, with large punctures with raised rims (crater punctures) .....***humilis* Imhoff**
- Disc of T1 smooth, either shiny or weakly shagreened, never with crater punctures 8
8. Fore margin of clypeus clearly upturned. Head clearly broader than long ..... ***chrysosceles* (Kirby)**
- Fore margin of clypeus not upturned. Head generally round, not noticeably broader than long 9
9. A3 as longer than A4+5 10

Figs 87-92. 87, *Andrena schencki* Morawitz, 1866, male face, frontal view. 88, *A. labiata* Fabricius, 1781, male genital capsule. 89, *A. viridescens* Viereck, 1916, male face, frontal view. 90, *A. tarsata* Nylander, 1848, male face, frontal view. 91, *A. coitana* (Kirby, 1802), male face, frontal view. 92, *A. labialis* (Kirby, 1802), male face, frontal view.

A3 at most as long as A4+5, often shorter 11
10. Head much shorter than broad, laterally with black hairs along the inner margin of the compound eye (Fig. 90). Body size small, 7-9 mm ..... ***tarsata* Nylander**
- Head as long as broad, with slightly elongated clypeus, without dark hairs laterally. Much larger, 14-16 mm ..... ***hattorfiana* (Fabricius)**
11. Gena strongly broadened, twice the width of the compound eye. Yellow facial markings restricted to the clypeus ..... ***ventralis* Imhoff**
- Gena not noticeably broadened, more or less as wide as the compound eye. Yellow facial margins present on the lower paraocular areas in addition to the clypeus 12
12. Lower paraocular areas with small white flecks (Fig. 91). Body size small, 7-8 mm. T1 finely and sparsely punctured, punctures separated by 2-4 puncture diameters..... ***coitana* (Kirby)**
- Lower paraocular areas with extensive yellow markings (Fig. 92). Larger, 10-12 mm. T1 densely punctate, punctures separated by 1 puncture diameter ..... ***labialis* (Kirby)**
13. Propodeal triangle strongly delineated laterally by a raised carina, internal surface covered by wavy and irregular but strongly raised carinae, the sculpturing of the internal surface usually strongly contrasting the dorsolateral parts of the propodeum (Fig. 24-25) 14
- Propodeal triangle delineated laterally by a carina or not, but internal surface never so strongly sculptured, without strongly raised carinae 20
14. Forewing with two submarginal cells ..... ***lagopus* Latreille**
- Forewing with three submarginal cells 15
15. Abdomen with metallic blue reflections. T4-6 laterally with clear patches of white hair .... ***agilissima* (Scopoli)**
- Abdomen dark, without metallic reflections. T4-6 without patches of white hair 16
16. Face with light brown pubescence. Marginal area of T2-3 occupying half the length of the tergum. Body size relatively small, 9-11 mm ..... ***haemorrhoa* (Fabricius)**
- Face with dark brown or black pubescence. Marginal area of T2-3 occupying at most 1/3rd of the length of the tergum. Body size larger, 12-14 mm 17

Extraction of the genital capsule is essential to separate the following four species.

17. Mesosoma with brown hair dorsally and laterally. Wings hyaline 18
- Mesosoma with a mixture of black, grey, and white hairs. If brown hairs are present, there are only a few. Wings hyaline to smoky 19
18. Genital capsule with gonostyli apically narrow. Penis valves relatively narrow, more or less parallel sided (Fig. 93). Typically bivoltine (March-May and July-August)..... ***bimaculata* (Kirby)**
- Genital capsule with gonostyli apically thickened. Penis valves broadened basally, margins converging apically (Fig. 94). Typically univoltine (March-May) ..... ***tibialis* (Kirby)**
19. Genital capsule appearing more elongate, with comparatively broad penis valves that strongly narrow apically (Fig. 19). Univoltine, flying predominantly in May and June. Typically not found in coastal environments; the dominant species of this species pair in Belgium ...***nigrospina* Thomson**
- Genital capsule appearing shorter, with comparatively narrow penis valves that do not strongly narrow apically (Fig. 18). Bivoltine, flying predominantly in March-April and July-August. Typically found on the coast, the rarer of this species pair in Belgium ..... ***pilipes* Fabricius**
20. Small species with body length under 9 mm (if under 9 mm and fore margin of clypeus is upturned, go to 73). Metasoma entirely dark (majority of members of the subgenus *Micrandrena*; *nota bene*, aberrantly small individuals can be produced in various species of *Andrena*; these will not key out properly, so if in doubt do not force a name when following this part of the key) 21
- Body length greater than 9 mm 39
21. Face with predominantly black hairs. Specimen captured during the spring (March-May) 22
- Face with predominantly pale hairs, occasionally with some darker hairs intermixed. Specimen captured in the spring or summer 27
22. Disc of T1 smooth and shining, microsculpture if present faint, surface clearly punctate 23
- Disc of T1 matt, strongly shagreened, with or without punctures 25
23. T1 with punctures extending onto marginal area. S2 matt, strongly shagreened and with crater punctures. Stigma dark brown ..... ***nana* (Kirby)** (1st generation, extinct)

Figs 93-94. 93, *Andrena bimaculata* (Kirby, 1802), male genital capsule. 94, *A. tibialis* (Kirby, 1802), male genital capsule.

- T1 with marginal area impunctate. S2 less strongly shagreened, weakly shining. Stigma light 24

24. Scutum sparsely punctate, punctures separated by more than 2 puncture diameters. T2 basally with punctures separated by 1 puncture diameter, tergal margin clearly depressed .....***floricola*** **Eversmann** (1st generation, species not confirmed from Belgium)
- Scutum more densely punctate, punctures separated by 1-2 puncture diameters. T2 basally with punctures separated by less than 1 puncture diameter, tergal margin less clearly depressed centrally than laterally .....***alfkenella*** **Perkins** (1st generation, not confirmed from Belgium)

25. Tergal margins clearly and progressively depressed, most clearly on terga 4-5. Scutum almost impunctate, with only scattered and minute punctures .....***pusilla*** **Pérez** (1st generation)
- Tergal margins not noticeably depressed. Scutum with clear punctures 26

26. Scutum densely punctate, punctures separated by 1 puncture diameter. Scutellum matt. Genital capsule with gonocoxae evenly rounding into gonostyli, penis valves not broadened basally (Fig. 95) ..... ***minutula*** **(Kirby)** (1st generation)
- Scutum less densely punctate, punctures separated by more than 1 puncture diameter. Scutellum shiny. Genital capsule with gonocoxae slightly inflated, not smoothly transitioning into gonostyli, base of penis valves slightly bulbous (Fig. 96) .....***minutuloides*** **Perkins** (1st generation)

27. Disc of T1 smooth and shining, microsculpture if present faint, surface clearly punctate 28
- Disc of T1 matt, strongly shagreened, with or without punctures 30

28. T1 with punctures extending onto marginal area. S2 matt, strongly shagreened and with crater punctures. Stigma dark brown ..... ***nana*** **(Kirby)** (2nd generation, extinct)
- T1 with marginal area impunctate. S2 less strongly shagreened, weakly shining. Stigma light 29

29. Scutum sparsely punctate, punctures separated by more than 2 puncture diameters. T2 basally with punctures separated by 1 puncture diameter, tergal margin clearly depressed .....***floricola*** **Eversman** (2nd generation, not confirmed from Belgium)
- Scutum more densely punctate, punctures separated by 1-2 puncture diameters. T2 basally with punctures separated by less than 1 puncture diameter, tergal margin less clearly depressed centrally than laterally ..... ***alfkenella*** **Perkins** (2nd generation, not confirmed from Belgium)

30. Genital capsule with penis valves clearly and strongly broadened basally, clearly bulbous in appearance (Figs 98-99) 31
- Genital capsule with penis valves not strongly broadened basally, not bulbous in appearance 32

31. Antennal segment 3 slightly longer than segment 4, clearly shorter than segments 4+5. Clypeus flattened, punctate with large sparse punctures, with broad impunctate longitudinal mid-line. Genital capsule comparatively short (Fig. 98) ..... ***strohmella*** **Stöckhert**
- Antennal segment 3 as long as segments 4+5. Clypeus domed, punctate with small fine punctures, at most with obscure impunctate longitudinal mid-line. Genital capsule comparatively elongate (Fig. 99) .....***falsifica*** **Perkins**

Figs 95-102. 95, *Andrena minutula* (Kirby, 1802), male genital capsule. 96, *A. minutuloides* Perkins, 1914. 97, *A. proxima* (Kirby, 1802), male genital capsule. 98, *A. strohmella* Stöckhert, 1928. 99, *A. falsifica* Perkins, 1915, male genital capsule. 100, *A. niveata* Friese, 1887, male genital capsule. 101, *A. semilaevis* Pérez, 1903, male genital capsule. 102, *A. subopaca* Nylander, 1848, male genital capsule.

32. T2-3 densely punctate, tergal margins strongly depressed, in fresh specimens with long thick hairbands that obscure the underlying surface. Genital capsule elongate, penis valves long and thin with pronounced point apically (Fig. 100) ..... ***niveata* Friese**
- Combination of characters different; specifically, never with long thick tergal hairbands 33
33. A4 as long as wide, thus square, a little shorter than A3 (Fig. 105). Tergal margins strongly depressed and shiny (Fig. 103). Genital capsule with moderately produced rounded gonocoxal teeth (Fig. 101) ..... ***semilaevis* Pérez**
- A4 always shorter than wide, never square, always shorter than A3 (Fig. 106) 34
34. Scutum with fine and sparse punctation, punctures separated by 2-4 puncture diameters, underlying surface matt 35
- Scutum with clear, often coarse punctures, punctures separated by 1-2 puncture diameters, underlying surface matt to shiny 36
35. Tergal margins narrow, narrower than the length of the final antennal segment, clearly and progressively depressed, most clearly on terga 4-5 ..... ***pusilla* Pérez** (2nd generation)
- Tergal margins broad, as broad as the length of the final antennal segment, weakly depressed. Genital capsule (Fig. 102) ..... ***subopaca* Nylander**
36. Scutum densely and regularly punctate, punctures predominantly separated by 1 puncture diameters. Scutellum matt to shiny 37
- Scutum coarsely but irregularly punctate, punctures separated by 1-2 puncture diameters. Scutellum shiny 38
37. Marginal areas of terga 2-3 weakly depressed centrally. Terga 1-2 with obscure punctures hidden in microsculpture. Genital capsule (Fig. 95) ..... ***minutula* (Kirby)** (2nd generation)

Figs 103-106. *Andrena semilaevis* Pérez, 1903. 103, male terga, dorsal view. 105, male antennae; *A. anthrisci* Blüthgen, 1925. 104, male terga, dorsal view. 106, male antennae.

- Marginal areas of terga 2-3 strongly depressed centrally. Terga 1-2 with clear punctures visible despite microsculpture ..... ***alfkenella* Perkins** (2nd generation, not confirmed from Belgium)

38. T1-3 with discs strongly punctate, margins of terga 2-3 strongly depressed (Fig. 104) ..... ***anthrisci* Blüthgen** (not confirmed from Belgium)
- T1-3 with discs weakly punctate, margins of terga 2-3 weakly depressed. Genital capsule (Fig. 96) ..... ***minutuloides* Perkins** (2nd generation)

39. Clypeus strongly flattened over almost its entire area (subgenus *Taeniandrena*; extraction of the genital capsule is essential for correct identification) 40
- Clypeus not strongly flattened 46

40. Clypeus medially slightly concave, strongly shagreened with shallow and obscure punctures. Genital capsule with clearly projecting gonocoxal teeth. Penis valves strongly broadened basally, converging apically (Fig. 107). ..... ***lathyri* Alfken**
- Clypeus flat, without slight medial concavity. Genital capsule with at most weakly projecting gonocoxal teeth. Penis valves either not strongly broadened basally, or if strongly broadened basally then inner margins of the gonocoxa strongly divergent 41

41. Penis valves strongly broadened basally, inner margin of the gonocoxa strongly divergent (Figs 108-109) 42

Penis valves not strongly broadened basally, inner margins of the gonocoxa more or less parallel 43

42. Central opening of penis valves very wide, wider than diameter of the median ocellus (Fig. 108) ..... ***intermedia* Thomson** (not confirmed from Belgium)
- Central opening of penis valves narrow, less than the diameter of the median ocellus (Fig. 109) ..... ***gelriae* van der Vecht** (extinct)

43. A4 long, clearly longer than A3, approximately 1.4 times longer (Fig. 110). Terga with large, somewhat irregular punctures. Tergal hairbands narrow, those on T2-3 medially interrupted, never complete .....wilkella
- A4 not so long, more or less equal to A3 in length, never 1.4 times longer (Fig. 111). Terga either with weak or more regular punctures, never with large irregular punctures. Tergal hairbands either interrupted or continuous 44

44. Terga with obscure, weak punctures (Fig. 112). A4 as long as or slightly shorter than A3. At least apical part of hind tibiae and basitarsi orange, often with entire hind tibiae orange. Univoltine, April-June ..... ***russula* Lepeletier**
- Terga with clear, regular punctures. A4 as long as or slightly longer than A3. Hind tibiae usually dark. Bivoltine, can be found March-August 45

The following two species are challenging to separate in the male sex, as individuals do not perfectly conform to all characters; association should be made with females and phenological clues utilised.

45. Terga more densely punctate, shagreened and matt. A4 slightly longer than A3. Genital capsule comparatively more slender, gonostyli narrower, external margin weakly concave. Internal margins of gonocoxae usually parallel apically. Penis valve on average slightly narrower basally (Fig. 113). Bivoltine, typically March-April and June-July ..... ***ovatula* (Kirby)**
- Terga less densely punctate, surface more finely shagreened, weakly shining. A4 equal to A3 in length. Genital capsule comparatively less elongate, gonostyli broad with external margin usually straight. Internal margins of gonocoxae slightly divergent apically. Penis valve slightly broader basally (Fig. 114). Bivoltine, typically mid-May to June and July-August ..... ***afzeliella* (Kirby)**

46. Terga usually extensively red marked. Pronotum laterally with strong humeral angle. Clypeus smooth and shining, sparsely punctate, punctures separated by >1 puncture diameter. Inner margins of compound eyes diverging ventrally. Genital capsule elongate, distinctive (Fig. 115) ..... ***florea* Fabricius**
- Combination of characters different. Terga with or without red markings. Pronotum with or without humeral angle. Clypeus more or less densely punctate. Inner margins of compound eyes typically parallel. Genital capsule different 47

47. Process of the labrum elongate, apex thickened, projecting forwards (Fig. 116). Pronotum with very strong humeral angle, angulate, with shining vertical furrow (Fig. 117). Gena broadened, equalling

Figs 107-114. 107, *Andrena lathyri* Alfken, 1899, male genital capsule. 108, *A. intermedia* Thomson, 1870 male genital capsule. 109, *A. gelriae* van der Vecht, 1927, male genital capsule. 110, *A. wilkella* (Kirby, 1802), male antennae. 111, *A. afzeliella* (Kirby, 1802), male antennae. 112, *A. russula* Lepeletier, 1841, male terga, dorsal view. 113, *A. ovatula* (Kirby, 1802), male genital capsule. 114, *A. afzeliella* (Kirby, 1802), male genital capsule.

or exceeding width of the compound eye. Clypeus broadly flattened, apicomedially with slight depression. Active only in the summer (June-September, subgenus *Cnemidandrena*) 48

- Combination of characters different. Process of the labrum not noticeably elongate or thickened (Fig. 118). Pronotum with a humeral angle or not. Gena broadened or not. Clypeus more or less domed, without apicomedial depression. Active in the spring or the summer 50

48. Gena strongly broadened, laterally and dorsally strongly produced into a winged carina (Fig. 117) ..... ***denticulata* (Kirby)**

- Gena broadened, but hind margin evenly rounded, not carinate 49

49. Galea with outer surface smooth and shining ..... ***fuscipes* (Kirby)**

Figs 115-120. 115, *Andrena florea* Fabricius, 1793 male genital capsule; *A. denticulata* (Kirby, 1802). 116, male face and process of labrum, frontolateral view. 117, male pronotum, lateral view. 118, *A. trimmerana* (Kirby, 1802), male face and process of labrum, frontolateral view. 119, *A. helvola* (Linnaeus, 1758), male face, frontal view. 120, *A. fulvago* (Christ, 1791), male face, frontal view.

- Galea with outer surface shagreened and dull ..... ***nigriceps* (Kirby)**
50. Mandibles long, sickle-like, strongly crossing in their apical half of third (Fig. 119). Gena usually broadened and angulate, thus squarish 51
- Mandibles shorter, not strongly crossing apically (*nota bene*, mandibles will always cross slightly in all species when closed; Fig. 120). Gena broadened or not, but evenly rounded, not angulate 70
51. A3 short, typically ¼ to 1/3rd the length of A4 (Fig. 121; if mesosoma with metallic blue reflections go to 76) 52
- A3 longer, never shorter than ½ the length of A4, usually as long as A4 or longer (Figs 122-123) ... 55
52. S8 truncate, lacking apical emargination, at most with a very slight medial impression (Fig. 124). Discs of T2-3 often extensively red marked ..... ***rosae* Panzer**
- S8 with clear and deep apical emargination (Fig. 125). Tergal discs red marked or not 53
53. Mandibles unidentate, lacking an inner subapical tooth (Fig. 118). Gena usually with a long spine (Fig. 118). Flying only in the spring (March-April) ..... ***trimmerana* (Kirby)** (1st generation)
- Mandibles bidentate, with an inner subapical tooth (Fig. 126). Gena usually without a spine, sometimes with a very short spine. Flying in the spring or the summer 54
54. Flying in the spring (usually April-May). Facial pubescence long ..... ***scotica* Perkins**
- Flying in the summer (usually mid-June to July). Facial pubescence short ..... ***trimmerana* (Kirby)** (2nd generation)
55. Mandibles unidentate, lacking an inner subapical tooth. Hind tibiae and basitarsi lightened orange ..... ***ferox* Smith**
- Mandibles with inner subapical tooth. Legs usually dark, hind basitarsi may be lightened orange 56
56. Body size large (13-15 mm), bee robustly build, with head large, metasoma broad, ovoid. Mesosoma with long grey pubescence, face white hairs medially, with abundant black hairs along the inner margin of the compound eye. Area between disc and marginal area of T1 with several longitudinal impressions ..... ***vaga* Panzer**
- Body size typically smaller. Bee less robustly built, metasoma not so ovoid. Mesosoma with or without long grey pubescence. T1 without longitudinal impressions 57
57. Base of mandible with a clear, ventrally-projecting tooth (Figs 1-2; 127-129) 58
- Base of mandible without a tooth, at most with a slight angulation (Figs 130-132) 64
58. A3 1.8 times longer than A4 (Fig. 123). Hind tarsi lightened orange ..... ***fulva* (Müller)**
- A3 at most 1.3 times longer than A4, usually more or less equal in length. Hind tarsi dark to reddish 59
59. Propodeum with majority of hairs black, at most with scattered pale hairs (Fig. 12-13) 60
- Propodeum with majority of hairs pale, at most with scattered dark hairs 62
60. S8 apically emarginate. Slightly smaller, 9-11 mm ..... ***praecox* (Scopoli)**
- S8 apically truncate (Fig. 14). Slightly larger, 10-12 mm 61
61. Basal mandibular tooth long (Fig. 1) ..... ***apicata* Smith**
- Basal mandibular tooth short (Fig. 2) ..... ***batava* Pérez**
62. Basal mandibular tooth short (Fig. 128). Apical margins of S2-4 with long loose hairs that do not form clear fringes, hairs longer than the hind basitarsis. Flying later in the year (June-August) ..... ***fucata* Smith**
- Basal mandibular tooth long (Fig. 129). Apical margins of S2-4 with dense fringes composed of short hairs, these hairs not exceeding the length of the hind basitarsis. Flying earlier in the year (March-June)..... 63
63. Hind tarsi reddish. Genital capsule more elongate, gonocoxal teeth comparatively weak. Flying during March-May, associated with *Salix* ..... ***mitis* Schmiedeknecht**
- Hind tarsi dark. Genital capsule more compact, gonocoxal teeth strongly produced. Flying during May-June, associated with *Vaccinium* ..... ***lapponica* Zetterstedt**
64. Mandible at its base with an angulation (Figs 130-132) 65
- Mandible without any kind of angulation at its base 67
65. Mandible at its base with angulation forming a 90o angle (Fig. 130). In fresh specimens, clypeus with golden hairs ..... ***helvola* (Linnaeus)**

- Mandible at its base with angulation rounded, forming an obtuse angle (c. 120o). In fresh specimens, clypeus with white hairs 66

66. Marginal area of T3 long, occupying 60% of dorsal area, surface smooth and shiny. A3 more or less equal to A4 in length .....***synadelpha* Perkins**

- Marginal area of T3 occupying at most 30% of dorsal area, surface shagreened weakly shining. A3 clearly longer than A4 ..... ***varians* (Kirby)**

67. Sterna with dense, thick hairbands on apical margins. Mesepisternum or propodeum with some black hairs. Penis valves with laterally-projecting hyaline extensions. Normally larger, 9-15 mm 68

- Sterna without dense, thick hairbands. Mesepisternum and propodeum uniformly brown haired. Penis valves without laterally-projecting hyaline extensions. Normally smaller, 8-11 mm 69

Figs 121-126. 121, *Andrena trimmerana* (Kirby, 1802), male antennae. 122, *A. fulvago* (Christ, 1791), male antennae. 123, *A. fulva* (Müller, 1766), male antennae. 124, *A. rosae* Panzer, 1801 male S8, dorsal view. 125, *A. trimmerana* (Kirby, 1802), male S8, dorsal view. 126, *A. scotica* Perkins, 1916 male mandibles, ventral view.

68. Large species, exceeding 13 mm in length. Mesosoma predominantly grey haired, with some black hairs on the propodeum ..... ***nycthemera* Imhoff**
- Smaller, usually 9-12 mm in length. Mesosoma with bright reddish brown hairs, with some black hairs on the mesepisternum ..... ***clarkella* (Kirby)**

69. Marginal area of T2 strongly depressed, smooth and shining ..... ***angustior* (Kirby)**
- Marginal area of T2 not noticeably depressed, shagreened, not strongly differentiated from tergal disc ..... ***fulvata* Stöckhert**

70. A3 two times longer than A4 (Fig. 133) 71
- A3 shorter, at most 1.8 times longer than A4 73

Figs 127-132. 127, *Andrena fulva* (Müller, 1766), male mandibular tooth. 128, *A. fucata* Smith, 1847, male mandibular tooth. 129, *A. mitis* Schmiedeknecht, 1883, male mandibular tooth. 130, *A. helvola* (Linnaeus, 1758), male mandibular tooth. 131, *A. synadelpha* Perkins, 1914, male mandibular tooth. 132, *A. varians* (Kirby, 1802), male mandibular tooth.

71. Fore margin of clypeus upturned. Head broad, broader than long. Mandibles somewhat elongate, slightly crossing apically. Small species, 7-9 mm ..... ***nitidiuscula* Schenck**
- Fore margin of clypeus not upturned. Head rounded, not broader than long. Mandibles not elongate. Larger, 9-11 mm 72
72. S8 with short hairs that do not noticeably project laterally. Tarsal segment 5 of the hind leg elongate and bent. Slightly larger, 10-11 mm ..... ***curvungula* Thomson**
- S8 with long, laterally projecting hairs. Tarsal segment 5 of the hind leg not noticeably bent. Slightly smaller, 9-10 mm ..... ***pandellei* Pérez**
73. A3 shorter than or equal to the length of A4 (Figs 122; 134-135) 74
- A3 longer than A4 (Figs 136-137) 85

Figs 133-138. 133, *Andrena pandellei* Pérez, 1895, male antennae. 134, *A. dorsata* (Kirby, 1802), male antennae. 135, *A. nitida* (Müller, 1766), male antennae. 136, *A. flavipes* Panzer, 1799, male antennae. 137, *A. barbilabris* (Kirby, 1802), male antennae. 138, *A. fulvago* (Christ, 1791), male antennae.

74. Face and mesosoma extensively white-haired, with at most a few scattered black hairs on the scutum and along the inner margin of the compound eyes. Metasoma with weak metallic blue reflections ..... ***cineraria* (Linnaeus)**
- Face and mesosoma without abundant white hairs. Metasoma without metallic blue reflections 75
75. A4-13 ventrally shiny (Fig. 138), ventral surface of A4 therefore contrasting with ventral surface of A3, all tarsi and hind tibiae lightened orange ..... ***fulvago* (Christ)**
- Antennae ventrally dull, not shiny. At most with hind tarsi lightened orange 76
76. Genital capsule with penis valves broad at base, narrowed apically, apexes thickened, truncate. Gonostyli broadened apically, inner angle approaching a 90° angle. Pubescence of body entirely brown, except for a few dark hairs along the inner margin of the compound eye ..... ***fulvida* Schenck**
- Genital capsule different. Pubescence of body with white, light brown, or more extensive black hairs 77
77. Tarsal segments elongated, tarsal segment 2 of the hind leg at least three times longer than broad (Fig. 139). Body size smaller, 8-10 mm (subgenus *Simandrena*)..... 78
- Tarsal segments not so elongated, tarsal segment 2 of the hind leg less than three times as long as broad (Fig. 140). Body size larger, 12-14 mm 81
78. Terga smooth and shiny, densely punctate with large punctures, punctures separated by 0.5-1 puncture diameters ..... ***combinata* (Christ)** (extinct)
- Terga strongly shagreened, dull (Figs 141-142). More finely punctate, punctures separated by 1-2 puncture diameters 79
79. Terga more sparsely punctate, punctures on disc of T2 separated by 2 puncture diameters (Fig. 142). Face with extensive black hairs, covering entirety of clypeus, some lighter hairs around the antennal insertions ..... ***confinis* Stöckhert**
- Terga more densely punctate, punctures on disc of T2 separated by 1 puncture diameter (Fig. 141). Face either with entirely light hairs or with mixture of light and dark hairs 80
80. Face with entirely light hairs (Fig. 143). Scutum shagreened and dull. Hind tarsi lightened orange ..... ***dorsata* (Kirby)**
- Face with predominantly dark hairs, with some light hairs intermixed around the antennal insertions (Fig. 144). Scutum polished, shining. Hind tarsi dark ..... ***propinqua* Schenck**
81. Face with extensive white pubescence, with black hairs limited to inner margins of compound eyes ..... ***nitida* (Müller)**
- Face with entirely dark or dark brown hairs 82
82. Mesepisternum and propodeum with extensive black hairs. Hind tibial spurs black ..... ***thoracica* (Fabricius)** (extinct)
- Mesepisternum and propodeum with brown hairs. Hind tibial spurs light brown 83
83. Marginal areas of terga with narrow section of apical rim lightened, tergal discs with weak bronzy reflections. Face with mixture of dark brown and black hairs. Common and widespread ..... ***nigroaenea* (Kirby)**
- Marginal areas of terga and terga discs uniformly dark, without bronzy reflections. Face with uniformly dark hairs. Very rare 84
84. Terga smooth and shining, with clear punctures, including on T1 ..... ***limata* Smith** (not confirmed from Belgium)
- Terga shagreened, with punctures obscure, on T1 punctures disappearing into the shagreen ..... ***assimilis* Radoszkowski** (very rare)
85. Genital capsule with apex of gonostylus triangular, external angle acute (see illustrations in Praz *et al*., 2019; Reemer 2019). A3 only slightly longer than A4. Pubescence entirely brown, with only occasional scattered black hairs laterally on face ..... ***rufula* Schmideknecht**
- Genital capsule with apex of gonostylus otherwise. A3 clearly longer than A4. Pubescence variable, often with abundant black hairs 86
86. Face with predominantly black hairs, at most with a few pale hairs around the antennae insertions (Fig. 145) and mesepisternum with at least some black hairs laterally ..... ***bicolor* Fabricius** aggregate

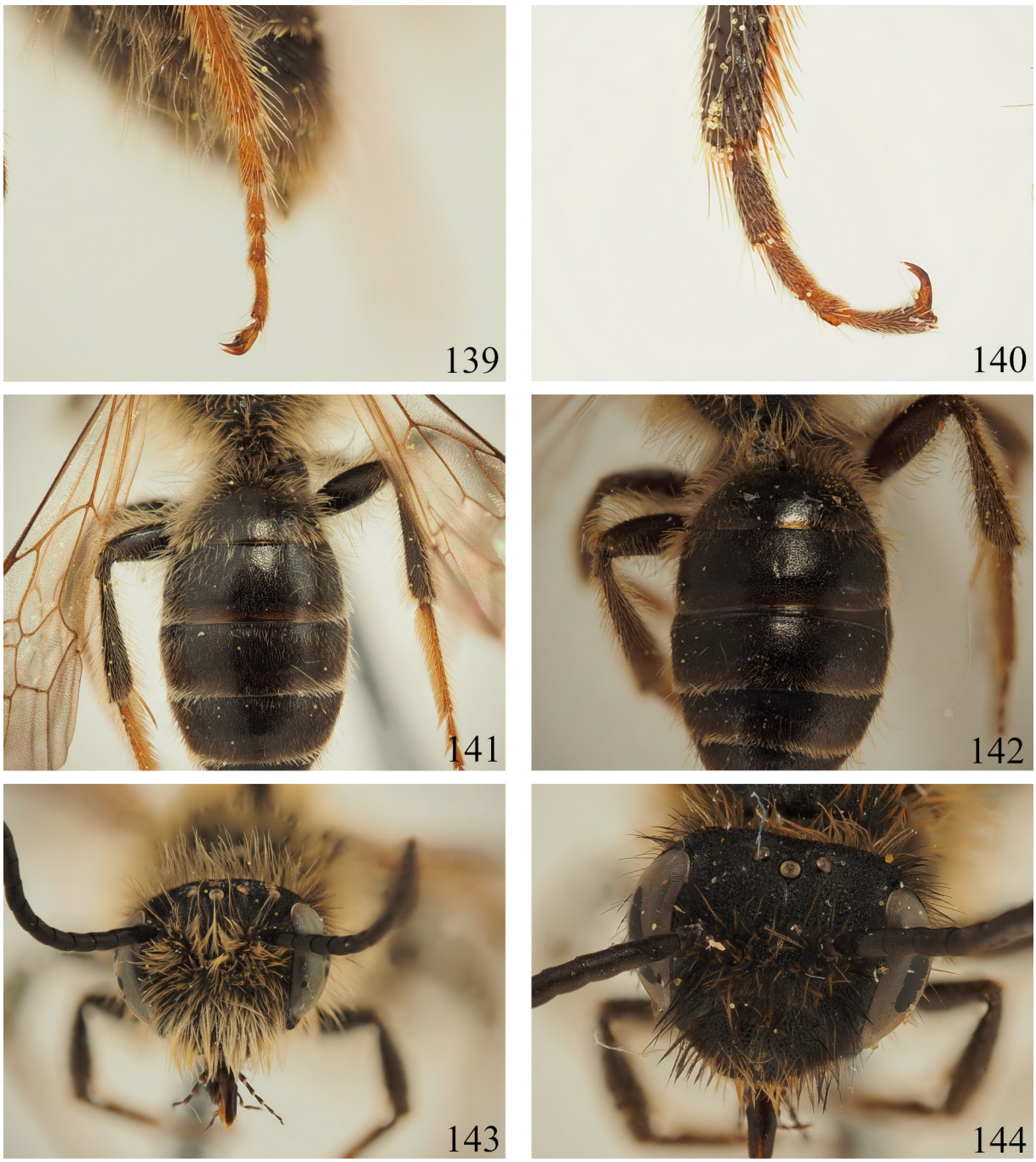
- Face either without black hairs on the face, of if black hairs present, then intermixed with many pale hairs, particularly around the antennal insertions. Mesepisternum without black hairs 87

87. Terga strongly shagreened, dull, with obscure and sparse punctures, punctures with slightly raised edges. Apexes of hind tibiae and tarsi can be lightened orange. Face and mesepisternum with long white hairs ..... ***ruficrus* Nylander**

- Terga more smooth and shiny or more finely shagreened, weakly shining, never strongly shagreened and dull. Legs always dark. Face and mesepisternum with white hair or not 88

88. Terga finely and obscurely punctate (Figs 146-147). Pubescence of body white 89

- Terga more clearly and coarsely punctate. Pubescence of body yellow to brown 90



Figs 139-144. *Andrena dorsata* (Kirby, 1802). 139, male hind tarsi. 141, male terga, dorsal view. 143, male face, frontal view. 140, *A. nitida* (Müller, 1766), male hind tarsi. 142, *A. confinis* Stöckhert, 1930, male terga, dorsal view. 144, *A. propinqua* Schenck, 1853, male face, frontal view.

89. Terga with denser punctures, punctures separated by 1-2 puncture diameters (Fig. 146). Terga generally without long upstanding hairs, terga margins with clear and dense apical hairbands that obscure the underlying surface. Smaller, 8-9 mm ..... ***argentata* Smith**
- Terga with punctures sparse, separated by 2-3 puncture diameters (Fig. 147). Terga with long upstanding hairs, tergal margins with unclear weak apical hairbands. Larger, 9-11 mm .....***barbilabris* (Kirby)**
90. Scutum shiny. Genital capsule unique, with penis valves basally strongly narrowed (Fig. 148) .....***polita* Smith**
- Scutum shagreened, matt. Genital capsule otherwise (Figs 97; 149-150) 91

Figs 145-150. 145, *Andrena bicolor* Fabricius, 1775, male face, lateral view. 146, *A. argentata* Smith, 1844, male terga, dorsal view. 147, *A. barbilabris* (Kirby, 1802), male terga, dorsal view. 148, *A. polita* Smith, 1847, male genital capsule. 149, *A. flavipes* Panzer, 1799, male genital capsule. 150, *A. gravida* Imhoff, 1832, male genital capsule.

91. Scutum with punctures so dense that they become confluent, margins of punctures join together to form network of interconnected ridges. Clypeus strongly domed, with raised latitudinal carinae. Terga with hairbands interrupted medially. Genital capsule elongate (Fig. 97). Generally smaller, 8-10 mm ..... ***proxima* (Kirby)**
- Scutum with individual punctures clearly separated, not confluent. Clypeus without raised latitudinal carinae. Terga with hairbands complete. Genital capsule more compact (Figs 149-150). Generally larger, 9-13 mm 92

92. Face entirely white-haired. Very similar to *A. gravida*, but associated with calcareous grassland .... ***chrysopyga* Schenck** (extinct)
- Face either with extensive dark hairs, or with at least dark hairs along the inner margin of the compound eye. Ubiquitous across Belgium 93

93. Face with a mixture of black and brown hairs, never with white hairs. Gonostyli with clear emargination in their apical margin (Fig. 149) ..... ***flavipes* Panzer**
- Face predominantly white haired, laterally with black hairs. Gonostyli with apical margin concave, without emargination (Fig. 150) ..... ***gravida* Imhoff**

Discussion

Extensive revisions to the faunas of southern European countries are expected due to the lack of taxonomic attention that they have received and a lack of domestic experts (e.g. Wood, 2021). However, the revision presented here demonstrates that many problems can persist in the literature for nominally better studied northern European countries such as Belgium (see also Le Divelec, 2021). The clarifications and taxonomic resources presented here will hopefully establish a stable base for the continued study of the Belgian *Andrena* fauna, as well as an assessment of its historical populations.

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