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Type specimens of *Andrena wollastoni* COCKERELL, 1922 (Hymenoptera, Anthophila): deposition, evaluation and designation of a lectotype

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A b s t r a c t : Six syntypes of *Andrena wollastoni* COCKERELL, 1922, endemic to Madeira Island and collected by T. V. Wollaston or someone of his fellow collectors, were detected in the Natural History Museum of London (NHMUK). The female specimen characterised by COCKERELL with a type label will be designated as lectotype (documented by photos); the five other specimens (also females) of the series will be designated as paralectotypes. Until now, it is an open question where these specimens came from, although they are provided with register labels. Three other specimens collected by T. V. Wollaston (1♂, 2♀♀) are actually deposited in the Oxford University Museum of Natural History (OUMNH). They were not mentioned in the description of COCKERELL (1922); therefore, they do not belong to the type series. One female and one male were collected from Porto Santo; a second female came from Madeira Island. They all were assigned to *A. minutula* by SAUNDERS (1903) and, after the description of COCKERELL (1922), to *A. wollastoni*. A revision of *A. wollastoni* specimens from Porto Santo confirmed the affiliation to a species of its own: *A. dourada* KRATOCHWIL & SCHEUCHL, 2013. Below the three specimens of T. V. Wollaston, there is a label ('new sp.?') written by Frederick Smith (1805-1879), the first hymenopterist who examined the collection in the OUMNH. The whereabouts of the two male syntype specimens of the Eaton collection (SAUNDERS 1903) remain unexplained.

A single female specimen (collected by Cockerell's wife, W. Porter Cockerell, in 1921 from Porto Santo) was mentioned in the description of COCKERELL (1922) and belong to the syntype series (characterised by Cockerell as cotype). This specimen, deposited in the National Museum of Natural History of Washington, DC (USNM), is documented by photos in this study and had to be designated as a paratype of *A. dourada*.

A. wollastoni specimens (6♂♂, 2♀♀), collected with high probability by the Austrian zoologist Georg von Frauenfeld during the Novara Expedition in 1857 from Madeira Island and originally assigned to *A. parvula* (*A. minutula*) by SICHEL (1868), are actually deposited in the Natural History Museum of Vienna (NHMV). Cockerell did not have knowledge about the existence of these specimens.

Probably the second person after Smith who realised the existence of a new *Micrandrena* species from Madeira was the German dipterologist T. Becker. He collected in 1904 two specimens (1♂, 1♀) from Madeira Island (deposited in the Biology Centre of the Upper Austrian Provincial Museum Linz, OLML), characterised by a handwritten label '*Andrena* spec nov.', but there was no description of the new species. This female specimen and the labels are documented by photos.

K e y w o r d s : Andrenidae, taxonomy, systematics, nomenclature, Madeira Archipelago.

Introduction

The English entomologist and malacologist Thomas Vernon Wollaston (1822-1878) or any of his fellow collectors sampled specimens of *Andrena* subgenus *Micrandrena* from Madeira Archipelago (Madeira Island, Porto Santo). These specimens (1♂, 2♀♀) were analysed by SAUNDERS (1903) and are part of the Wollaston Madeira collection (J. Hogan, pers. comm.), which was purchased in lots between 1860 and 1862 by Frederick William and Ellen Hope and donated by Frederick William Hope to the Oxford University Museum of Natural History (OUMNH) (see SMITH 1986). SAUNDERS (1903) entered the year 1861 as the date of purchase, but in this year, only the sale of land and water shells from Madeira took place (SMITH 1986). Two other males were collected by the English clergyman and entomologist Alfred Edwin Eaton (1844-1929) from Monte (27.02.1902, Funchal, Madeira). SAUNDERS (1903) characterised all these specimens as *A. minutula* (KIRBY, 1802).

Male specimens from the Eaton collection analysed by SAUNDERS (1903) and eight further females from the Wollaston collection served as type material for the description of *A. wollastoni* by COCKERELL (1922). According to COCKERELL (1922), all these specimens were deposited in the NHMUK. Six of the eight female specimens from Wollaston could be found in the NHMUK (D. Notton, pers. comm.). But until now, it is an open question where these specimens come from, although they are provided with register labels. The whereabouts of the male specimens of the Eaton collection analysed by SAUNDERS (1903) remain unexplained. They could not be found either in OUMNH or in NHMUK (J. Hogan & D. Notton, pers. comm.).

A single female (visiting the synflorescences of *Euphorbia* sp.), collected by Cockerell's wife, W. Porter Cockerell (16.01.1921, Vila Baleira, Porto Santo), was also mentioned in the description by COCKERELL (1922). This specimen of the type series was deposited by Cockerell in the National Museum of Natural History, Washington D.C. (USNM), characterised as a paratype of *A. wollastoni*.

A second location of detected Madeiran *Micrandrena* species of the nineteenth century is the Museum of Natural History of Vienna (NHMV). The specimens were collected during the Novara Expedition (1857-1859), the first broad-scale scientific mission of the Austrian Imperial Navy (BASCH-RITTER 2008). Two females and six males could be found in the NHMV (D. Zimmermann, pers. comm.). The collector was, with high probability, the Austrian zoologist Georg von Frauenfeld (1807-1873). The French physician and entomologist Frédéric Jules Sichel (1802-1868) identified these *Andrena* specimens (males and females) as *A. parvula* (KIRBY, 1802), a former synonym of *A. minutula* (KIRBY, 1802) (see SICHEL 1868). Apparently Cockerell did not have knowledge of the existence of these specimens.

The German dipterologist Theodor Becker collected in 1904 *Micrandrena* specimens (1♂, 1♀) from Madeira (deposited in the Biology Centre of the Upper Austrian Provincial Museum Linz, OLML). Both specimens were characterised by a handwritten label 'Madeira, Becker 04' and a handwritten label '*Andrena* spec nov.' (KRATOCHWIL & SCHEUCHL 2013). He (or someone else) realised the existence of a new species, but no species description followed.

The following aspects will be introduced:

1. A lectotype and further paralectotypes of the former *A. wollastoni* syntypes will be designated.

2. Considering the new taxonomical evaluation of *Micrandrena* specimens of Porto Santo (KRATOCHWIL & SCHEUCHL 2013), the female specimen collected by Porter Cockerell should be assigned to *A. dourada* and designated as a paratype of *A. dourada*. A morphological differential diagnosis should confirm this.
3. The deposition of the specimens analysed by SICHEL (1868) and SAUNDERS (1902) has to be proven.
4. The taxonomical status of the specimens of Becker, collected in the year 1904 ('*Andrena* spec nov. '), should be determined by morphological analysis.

Material and Abbreviations

The analysis is based on specimens of the following collections:

- Syntype series of *Andrena wollastoni* (6♀♀) from the Natural History Museum, London, England (NHMUK), photo documents of the type specimen including labels
- Specimens (1♂, 2♀♀) from the Oxford University Museum of Natural History (OUMNH), photo documents including labels
- Type specimen (1♀) of *A. wollastoni* from the Museum of Natural History, Washington (USNM), photo documents of the type specimen including labels
- Morphological examination of two specimens (1♂, 1♀) from the Biology Centre of the Upper Austrian Provincial Museum Linz (OLML), including photo documents
- Specimens (6♂♂, 2♀♀) from the Natural History Museum of Vienna (NHMV), including photo documents

Further abbreviations:

ICZN.....International Code of Zoological Nomenclature

RAMM:Museum of Exeter

Results and Discussion

1. *Andrena wollastoni* syntypes of the NHMUK and designation of a lectotype and paralectotypes

Charles Michener wrote about Cockerell (ZUPARKO 2008): 'In recent literature and verbal discussions, I note signs of confusion about the type material of some species described by T.D.A. Cockerell. Except in his early papers (probably before 1900), when Cockerell described a new species based on a single specimen, he labelled it "type". Such specimens are obviously holotypes. When he described a new species based on two or more specimens, he labelled one specimen "type"; the others were labelled "cotype". Thus he used "type" in the sense of holotype. Specimens labelled "cotype" are, in current terminology, paratypes. Thus it is not necessary to formally designate his "type" (= holotype) specimens as lectotypes, nor is it legitimate to designate a lectotype from among his cotype (= paratype) specimens unless the "type" is lost. Like others, Cockerell occasionally made mistakes. I have been told of a species for which two specimens were labelled "type". Obviously, they should be considered syntypes, and one should be selected as the lectotype. A different matter about Cockerell's types – he did not use red or any other color to

make them readily recognizable. Therefore, they are easily lost among other specimens. Also, his types are not always in the collection where one would expect to find them.'

There was no holotype or 'type' of *A. wollastoni* designated by COCKERELL (1922) in the original description; therefore these specimens represent only syntypes. *A. wollastoni* was clearly described from a series of specimens. The use of the word 'type' on a label is not necessarily evident that a specimen is fixed as a holotype (Art. 72.4.7, ICZN; D. Notton, pers. comm.). None of the other five specimens in the syntype series have a label of Cockerell. According to Art. 73.2.1 (ICZN) syntypes may include specimens with no identifying label (D. Notton, pers. comm.). To avoid confusion, the specimen labelled as 'type' may be preferably used for the designation of a lectotype, the other syntype specimens for the designation of paralectotypes (D. Notton, pers. comm.).

Six female specimens could be found in the NHMUK collected by Wollaston or someone of his fellow collectors from Madeira Island and serve as type material for the description of *Andrena wollastoni* by COCKERELL (1922) (D. Notton, pers. comm.).

The female with the barcode label NHMUK 012064942 will be designated as lectotype; the females with the barcode labels NHMUK 010811987, NHMUK 010811988, NHMUK 010811989, NHMUK 01081199 and NHMUK 010811991 will be designated as paralectotypes.

Lectotype

- Female NHMUK 012064942, pinned (probably later pinned, previously mounted on a squared cardboard similar to two other specimens of the series), in good condition (Fig. 1a-e). Labels are in the following order: register label printed 'Madeira 58-21' (Fig. 1g); handwritten type label (ink) by Cockerell '*Andrena wollastoni* Ckll TYPE' (Fig. 1f); round label with blue margin printed 'Syntype' (Fig. 1i), underneath printed label 'B.M. TYPE HYM.' and handwritten '17a2645' (registration number of Hymenoptera types of the NHMUK) (Fig. 1h), below barcode number 012064942 (Fig. 1j).

Paralectotypes

- Female NHMUK 010811987 (barcode label). The whole specimen is mounted on a square cardboard (yellowed with time), wings spread out, in good condition (Fig. 2a) (the cardboard did not have coloured signs, indicating that the female specimen was collected from Madeira Island [MACHADO 2006]); handwritten with ink on a square cardboard of the same quality '1165' (Fig. 2b); register label printed 'Madeira 58-21' (similar to lectotype Fig. 1g); label printed 'In B.M. 1967. Under' and then handwritten '*A. wollastoni* Ckll.? = *minutula*'; label printed '*Andrena*', handwritten '*wollastoni*', printed 'det. Dr. Warncke'; round label with blue margin printed 'Syntype' (similar to lectotype Fig. 1i), underneath handwritten 'SYNTYPE ♀, *Andrena wollastoni* Cockerell, 1922: 32, det. D. Notton, 2016'.

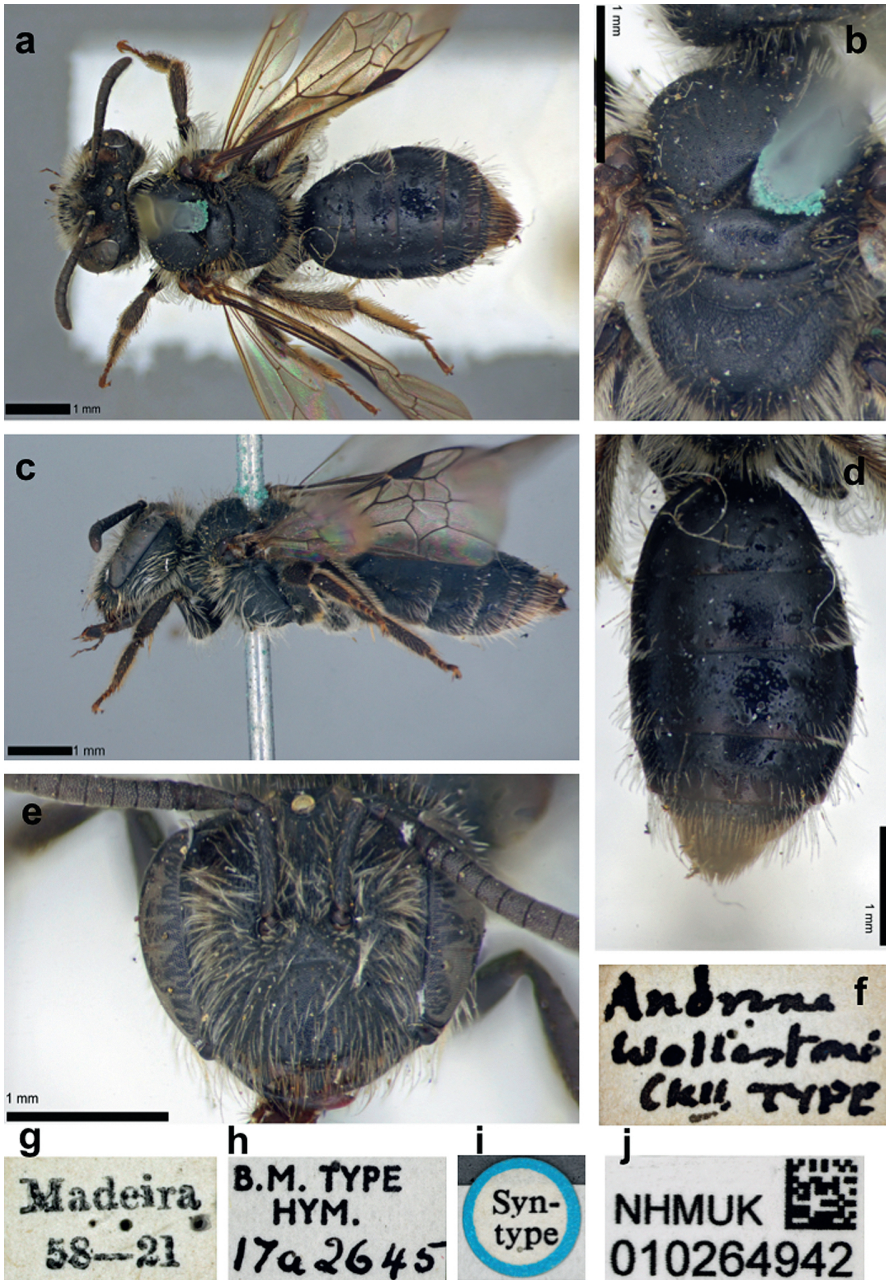


Fig. 1: Type specimen (lectotype) of *Andrena wollastoni* COCKERELL, 1922 (NHMUK). Photos by D. Notton. (a) habitus dorsal, (b) mesosoma dorsal, (c) habitus lateral, (d) metasoma dorsal, (e) head frontal, (f) type label, (g) register label, (h) type number label, (i) syntype label, (j) barcode number.

- Female NHMUK 010811988. The whole specimen is mounted on a cardboard with one side pointed (yellowed with time), wings spread out, in good condition (Fig. 3a); (the cardboard did not have coloured signs, indicating that the female specimen was collected from Madeira Island [MACHADO 2006]); handwritten with ink on a cardboard with one side pointed of the same quality '1087' (Fig. 3b); register label printed 'Madeira 58-21' (similar to lectotype Fig. 1g); round label with blue margin printed 'Syntype' (similar to lectotype Fig. 1i), underneath handwritten 'SYNTYPE ♀, *Andrena wollastoni* Cockerell, 1922: 32, det. D. Notton, 2016'.
- Females NHMUK 010811989, NHMUK 01081199, NHMUK 010811991. The specimens are mounted with minutien pins on Styrofoam strips (later pinned, previously mounted on a square cardboard similar to two other specimens of the series); register labels printed 'Madeira 58-21' (similar to lectotype Fig. 1g); round labels with blue margins printed 'Syntype' (similar to lectotype Fig. 1i), underneath handwritten 'SYNTYPE ♀, *Andrena wollastoni* Cockerell, 1922: 32, det. D. Notton, 2016'.

All the specimens were indicated by the same register label 'Madeira 58-21'; therefore, their affiliation to a series is obvious. In most of all cases, Wollaston did not attach data labels to his specimens (MORRIS 2011). The label of the type specimen and the other five females 'Madeira 58-21' is an administrative entry label for the acquisition register of a museum. The number 58 means '1858' (the entry in the museum's collections, not the year of collecting). The collection time is usually a much earlier date. Wollaston's true collecting labels were always handwritten (Machado, pers. comm.).

The origin of the six female specimens of *A. wollastoni* is still an open question. Also, the exact time of transfer to the collections of the NHMUK is not clear. The reference to the specimens in the published description of COCKERELL (1922) is evident. Cockerell had seen these specimens and labelled the type specimen in the NHMUK in 1921 or 1922 (D. Notton, pers. comm.). A comparison with typical 'Cockerell labels' confirms the authenticity of these labels. The time for the deposition of the syntypes covers the years between 1858 and 1922.

MACHADO (2006) described the chronology of the distribution of the Wollaston collections. In the NHMUK and OUMNH, there is no record for 'Madeira 58-21' (MACHADO 2006). Some collections from other museums were sold or just transferred to the NHMUK. They had own registration labels. For example, material of Cossonidae (today, the true weevil subfamily in the family Curculionidae) collected by Wollaston was located in the London collections (via E. W. Janson; see below), as well as the remnants of the Madeiran non-coleopteran insects deposited in the Museum of Exeter (RAMM), which were later incorporated in 1981 in the collections of NHMUK (MACHADO 2006). But this material was not accessible for Cockerell. The museum's registers of RAMM don't go back as far as 1858 as the museum wasn't yet built (H. Morgenroth, pers. comm.).

The number 21 in the label 'Madeira 58-21' refers to the 'twenty-first register of specimens', a group of specimens. In this context, it should be pointed out that the sale of insect collections was a profitable business. Thus, many who were concerned with insects were, at the same time, also businessmen and agents for persons who wanted to sell their collections. Edward Wesley Janson (1822-1891) was a fellow of the Entomological Society. In 1850, he was appointed curator of the collections of the society until 1863. He started up

his business in 1852, selling books and specimens. He was a friend of Wollaston, and he managed the sale of collections for him. Wollaston prepared the sales by listing the contents (numbers, species, localities) in independent lists for each collection that should be sold (MACHADO 2006).

The ‘London first list’ (first visit of Madeira Archipelago) ranked from 1 to 777, the list from the fourth visit from 1 to 222. The ‘Oxford list’ ranked from 1 to 1177 (more details in ISRAELSON 1991, MACHADO 2006). The order of numbers and species was neither systematical, alphabetical nor chronological. It appears to be random (ISRAELSON 1991). With high probability, specimens with the same number had been collected together, but this is only true for the separated lists (ISRAELSON 1991).

Two specimens of the syntype series have numbers corresponding to the locality codes (Figs 2a, 3a), but they cannot be interpreted because the key was lost (D. Notton, pers. comm.). Determination labels are missing. Both labels bear handwritten numbers ‘1087’ and ‘1165’ (Figs 2b, 3b). Regarding the locality numbers from Wollaston in Madeiran Coleoptera (Hope Collection) these numbers are also assigned ‘1087 *Oxyomus sabulosus*, near Funchal’ and ‘1165 *Psylliodes umbratilis*, taken by Mr. Bewick, Madeira’ (A. Machado, pers. comm.), but whether there is an identical number sequence is uncertain.



Fig. 2: Type specimen (paralectotype, female) of *Andrena wollastoni* COCKERELL, 1922 (NHMUK 010811987), collected by Wollaston from Madeira Island; (a) card-mounted specimen, (b) locality label. **Fig. 3:** Paralectotype, female (NHMUK 010811988), collected by Wollaston from Madeira Island; (a) card-mounted specimen, (b) locality label. All photos by D. Notton (NHMUK).

ISRAELSON (1991) pointed out that Wollaston had many interested fellow collectors from the Madeira Archipelago. Therefore, it is uncertain whether Wollaston was the true collector of the *Andrena* specimens. His main interest was the collection of beetles. According to ISRAELSON (1991), the material collected during Wollaston’s later expeditions (after 1855) was not numbered, and no lists were made.

The Warncke label of ‘NHMUK 010811987’ confirms the visit of the apidologist Dr. K. Warncke (Dachau, Germany) to the NHMUK. *A. wollastoni* was considered an endemic species for Madeira and the Canary Islands by WARNCKE (1968). Based on some morphological features, WARNCKE (1968) differentiated *A. wollastoni* into four subspecies: the nominate taxa *A. w. wollastoni*, COCKERELL, 1922 (Madeira, Porto Santo); *A. w. acuta* WARNCKE, 1968 (Tenerife, La Palma); *A. w. gomerensis* WARNCKE, 1993 (La Gomera, El Hierro); and *A. w. catula* WARNCKE, 1968 (Gran Canaria). WARNCKE (1968) considered only some differentiating morphological features and analysed few specimens (e.g. in the case of *A. w. wollastoni*, only two females and one male). A revision of the *A. wollastoni* complex is in preparation (Kratochwil, in prep.).

COCKERELL (1922) mentioned ‘eight in [the] British Museum; the females collected by

Wollaston'. Actually, two specimens are not detectable. It cannot be excluded that additional specimens may be present among extensive unidentified *Andrena* specimens in the NHMUK (D. Notton, pers. comm.). Cockerell explicitly mentioned the females of the NHMUK collected by Wollaston in the publication; therefore, it is evident that he has seen the specimens (D. Notton, pers. comm.). Cockerell was very familiar with the collections of the NHMUK, working there (e.g. in 1890).

2. *Andrena wollastoni* specimens collected by T. V. Wollaston and deposited in the OUMNH

One male and two females from Madeira Archipelago, collected by Wollaston (Figs 4a, 5a, 6a), are deposited in the OUMNH (SAUNDERS 1903). SAUNDERS (1903) states, 'The specimens are, of course, old and more or less faded; the smaller ones are often gummed on cards, which renders determination doubtful, and as it would be dangerous to remove specimens of this age, I have not attempted to found any new species on them... In spite of the poor condition of Wollaston's specimens, it is important to record, as far as possible, the forms which existed over half a century ago in an island so liable to accidental immigration as Madeira.'

The specimens were determined as *A. minutula* by Saunders (Figs 4b, 6b). Not mentioned by SAUNDERS (1903) is the fact that one male (Figs 4a, 4b) and one female (Fig. 5; label identical to Fig. 4b) were collected from Porto Santo; one other female (Figs 6a, 6b) was collected from Madeira Island. Both Porto Santo specimens have to be assigned to *A. dourada* (see KRATOCHWIL & SCHEUCHL 2013).

Cockerell had knowledge of the publication of SAUNDERS (1903) and he probably had seen the *Andrena* specimens of the OUMNH collected by Wollaston because he described in 1921 *Prosopis maderensis* sp.n., today *Hylaeus (Paraprosopis) maderensis* (female specimen), located near the *Andrena* specimens in the Wollaston collection (COCKERELL, 1921). This female was labelled by SAUNDERS (1903) as '*Prosopis ater*' (marked as '*Prosopis* n.sp. allied to *signata*'). *Hylaeus ater* (SAUNDERS, 1903) is restricted to the Canary Islands.

The male and two females of *A. wollastoni* are not mentioned in COCKERELL (1922) therefore, they do not belong to the type series.

a) Male: The whole specimen (Fig. 4a) is mounted on a squared cardboard (with the time yellowed), wings spread out, in good condition; the cardboard is colour-coded with blue indicating the female specimen comes from Porto Santo (MACHADO 2006); this information was not recorded by SAUNDERS (1903). There are no other labels from Wollaston with locality data or numbers. A later label (Fig. 4b) was added to each specimen after the 1903 publication by Saunders, '*Andrena minutula* Kirby' handwritten, 'Named 1903 by Ed. Saunders, Trans. Ent. Soc., 1903, p. 207-218.' printed.

b) Female: The whole specimen (Fig. 5) is mounted on a square cardboard (yellowed with the time), wings spread out, in good condition; the cardboard is colour-coded blue, indicating that the female specimen was collected from Porto Santo (MACHADO 2006). This information was not recorded by SAUNDERS (1903). There are no other labels from Wollaston with locality data or numbers. A later label (identical to Fig. 4b) was added to each specimen after the 1903 publication by Saunders: '*Andrena minutula* Kirby' handwritten, 'Named 1903 by Ed. Saunders, Trans. Ent. Soc., 1903, p. 207-218.' printed.

c) Female, pinned, in good condition (Fig. 6a); the lacking coloured label indicates that it was collected from Madeira Island. A later label (Fig. 6b) was added to each specimen after the 1903 publication by Saunders, '*Andrena minutula* Kirby' handwritten, 'Named 1903 by Ed. Saunders, Trans. Ent. Soc., 1903, p. 207-218.' printed.

The two specimens from Porto Santo were also card-mounted in the same way as specimens of the NHMUK. It is remarkable that Saunders did not publish the locality where the specimens were collected.



Fig. 4: *Andrena dourada* KRATOCHWIL & SCHEUCHL, 2013, male (OUMNH), collected by Wollaston from Porto Santo; (a) card-mounted specimen, (b) labels. **Fig. 5:** *A. dourada*, female (OUMNH), collected by Wollaston from Porto Santo; label identical to Fig. 4b. **Fig. 6:** *A. wollastoni* COCKERELL, 1922, female (OUMNH), collected by Wollaston from Madeira Island; (a) specimen, (b) labels. **Fig. 7:** Three labels below the specimens collected by Wollaston. All photos by J. Hogan (OUMNH).

According to our taxonomical study the former *A. wollastoni* specimens from Porto Santo belong to a species of its own: *A. dourada* KRATOCHWIL & SCHEUCHL, 2013. The OUMNH specimens can be depicted as a male and a female of *A. dourada*. In the paraocular area of *A. dourada* there are yellowish-white hairs from the malar area and overtop and no brownish hairs, in contrast to *A. wollastoni* with brownish hairs. The tibial scopa is characterised by yellowish-white hairs, but in the case of *A. wollastoni*, more than the half of the scopa and the basal area bear brownish hairs (KRATOCHWIL & SCHEUCHL 2013). An analysis of the scopa by macro photos proved the affiliation to *A. dourada*.

The specimens are in good condition; this is in contradiction to the description given by SAUNDERS (1903), also cited by MACHADO (2006) ('poor condition'). With high probability, the specimens were collected during the second visit of the Madeira Archipelago from November 1848 to June 1949 (Madeira, Porto Santo, Desertas). Wollaston visited in December 1848 and in April 1849 Porto Santo (together, more than a month) (MACHADO 2006). These are probably the first collected specimens of *A. dourada*.

Below the Wollaston specimens, three labels were mounted with the following contents:

a) Blue handwritten label 'new sp.?'. It was written by Frederick Smith (1805-1879), the first hymenopterist who examined the collection in the OUMNH and worked on the

specimens (Fig. 7). In 1849, he was first assistant, later senior assistant at the British Museum of Natural History. During the 28 years of his period of service, he described 25 genera and 702 species and subspecies (HARIS 2016). More than 40 years before the description of Cockerell, Smith realised the existence of a new species, but he did not carry out a description the species status.

b) Label '*minutula* K.', handwritten with ink on paper similar to the square cardboard of the specimens (yellowed with the time) (Fig. 7). A graphological analysis suggested that it is the handwriting of Saunders.

c) Printed label '*Andrena (Micrandrena)* sp. Not conspecific with *A. (M.) minutula* (K.) both sexes differing in all diagnostic features of surface sculpturing, ♂ genitalia & accessory sclerites missing. C. O'Toole, 2003'.

3. *Andrena wollastoni* type specimens collected by A. E. Eaton

According to SAUNDERS (1903), two males as part of the Eaton collection were mentioned, determined by Saunders as *A. minutula*, Kirb. (collected by Rev. Alfred E. Eaton, Monte, Funchal, Madeira, 06.03.1902, at about an 11000-foot altitude). According to COCKERELL (1922), these two males are characterised as types, and these specimens were deposited in the NHMUK. Actually, they cannot be located (D. Notton, pers. comm.), but other specimens of the Eaton collection are in the NHMUK (CORLEY 2014). Further checks in the OUMNH have shown that there are also hints of the specimens in question (J. Hogan, pers. comm.). The whereabouts of the male type specimens of the Eaton collection remain unexplained.

COCKERELL (1922) referred precisely to these males. He mentions in his description of *A. wollastoni* only males, which were collected by Eaton (Eaton collected no females of this species). With high probability, Cockerell did not see the male specimens that were collected by Wollaston at the time of his description of *A. wollastoni*, although there was one in the Oxford collection from Porto Santo. At least one male of Eaton should have a type label.

4. A former type of *Andrena wollastoni* (National Museum of Natural History, Washington, D.C.): Identification as *Andrena dourada* KRATOCHWIL & SCHEUCHL, 2013

A cotype of *A. wollastoni* is deposited in the collections of the USNM (Figs 8a-f), which is the female specimen collected by W. Porter Cockerell. In his publication, Cockerell wrote, 'A single female, collected by my wife in Porto Santo, is referred as *A. wollastoni*, though it is distinctly smaller and otherwise slightly different. It was on flowers of *Euphorbia* of the Villa Baleira, January 16, 1921. Possibly, a series would indicate a separate form'. There is no doubt that this specimen was deposited in the USNM by Cockerell. Locality labels were written by W. Cockerell Porter with pencil (Figs 8g, 8h), the cotype label by Cockerell with ink (Fig. 8i). Other type specimens of Cockerell were also deposited in the USNM (e.g. *A. portosantana* COCKERELL, 1922; see KRATOCHWIL et al. 2014).

Figures 8a to 8d document the specimen collected by W. Porter Cockerell. Labels written with pencil indicate the locality (Fig. 8g) and the date, 'Jan 16', the plant genus '*Euphorbia*', and the initials 'WPC' (Wilmatte Porter Cockerell) (Fig. 8h). Cockerell characterised this specimen as cotype (Fig. 8i). The USNM designated the specimen as

paratype (Fig. 2f). But according to our study, the former *A. wollastoni* specimens from Porto Santo belong to a species of its own: *A. dourada* KRATOCHWIL & SCHEUCHL, 2013. The USNM specimen is a female of *A. dourada*.

5. Identification of *Micrandrena* specimens collected during the Novara Expedition in 1858 from Madeira Island

In the NHMU, *Micrandrena* species were detected from the Novara Expedition (1857-1859), probably collected by the Austrian zoologist Georg von Frauenfeld (1807-1873) from Madeira Island. His main interest, however, was the systematic group of Macrolepidoptera (FELDER 1862).

The French entomologist and physician Frédéric Jules Sichel (1802-1868) identified these *A. wollastoni* males and females as *A. parvula* (KIRBY, 1802), a former synonym of *A. minutula* (KIRBY, 1802). In the collections of the NHMU, six males and two females were detected in a group of 85 specimens characterised as *A. parvula* (D. Zimmermann, pers. comm.) with the handwritten label (ink) 'Sichel 1865'. On the determination label, 'parvula Kirby' is written with ink, and 'det. Kohl.' is printed.

Franz Ferdinand Kohl (1851-1924) was the founder of the entomological collections of the NHMU in 1885, but this was 20 years later than the determination date of Sichel. It seems that the specimens of the Novara Expedition were not integrated in a special entomological collection before 1885. Kohl's interest was focused on Sphecidae.

In the publication of SICHEL (1868), only one male and one female are mentioned. Another male had its origin in the area of the Cape of Good Hope (South Africa). There is no label characterising their origin from the Novara Expedition, the collector Georg von Frauenfeld, the date of collection (June 8 and 17, 1857) or the locality. 'Sichel 1865' indicates the time of determination. Cockerell did not have knowledge of the existence of these specimens.

6. Identification of specimens collected and characterised as *Andrena* nov.sp. by Becker in 1904

A *Micrandrena* female and a male specimen collected by Becker in the year 1904 are deposited in the OLML (Fig. 9a). Both specimens were characterised by a violet circular label, a handwritten (brownish ink) label 'Madeira, Becker 04', a handwritten label (black ink) '*Andrena* spec nov.' (Fig. 9b) and a printed label '*Andrena wollastoni* CKLL. det. Dr. Warnecke'. This specimen was collected by Theodor Becker (1840-1928), a German civil engineer and entomologist, primarily known as a dipterologist (SPEISER 1920, LICHTWARDT 1928). Becker spent four weeks on Madeira in April 1904.

Based on the collection of dipters in this time, he contributed in 1908 a paper of Madeiran flies (BECKER 1908). Becker's collection is deposited in the Humboldt Museum of Berlin, Germany. The label '*Andrena* spec nov.' probably does not derive from Becker. We do not know anything of this label. A graphological analysis of the label would be helpful.



Fig. 8: Paratype of *Andrena dourada* KRATOCHWIL & SCHEUCHL, 2003, formerly type of *A. wollastoni* COCKERELL, 1922, collected by W. Porter Cockerell; (a) habitus lateral; (b) head frontal; (c) metasoma dorsal; (d) head dorsal; (e) paratype label (USNM) with type number; (f) barcode label; (g) locality label written by Cockerell (pencil); (h) label written by Wilmatte Porter Cockerell (pencil); (i) cotype label written by Cockerell (ink); photos by K. Darrow (USNM).

Fig. 9: *A. wollastoni*; (a) female collected by Becker in 1904 (OLML); (b) label; photos by the author.

Eighteen years before the description of Cockerell, Becker or someone else realised the existence of the new species, but no description followed. Cockerell did not have knowledge of the existence of these specimens.

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Zusammenfassung

Im Natural History Museum of London (NHMUK) befinden sich sechs Syntypen von *Andrena wollastoni* COCKERELL, 1922, eine auf Madeira endemische Sandbienen-Art, die von T.V. Wollaston oder einem seiner Helfer gesammelt wurden. Das mit einem Typen-Etikett gekennzeichnete Exemplar, ein Weibchen, wird als Lektotyp beschrieben und durch Fotobelege dokumentiert. Die fünf weiteren Weibchen der Typenserie werden zu Paralektotypen erklärt. Die Herkunft dieser Belege bleibt trotz Registrierungsetiketten unklar. Weitere drei von Wollaston gesammelte Belege, die jedoch in der Erstbeschreibung von COCKERELL (1922) nicht erwähnt werden, befinden sich im Oxford University Museum of Natural History (OUMNH). Sie gehören auch demnach nicht zur Typen-Serie. Ein Männchen und ein Weibchen davon wurden auf Porto Santo gesammelt und von SAUNDERS (1903) als *A. minutula* etikettiert. Eine Revision der früher als *A. wollastoni* von Porto Santo bezeichneten Exemplare ergab, dass es sich hierbei um eine eigene Art handelt: *Andrena dourada* KRATOCHWIL & SCHEUCHL, 2013. Ein weiteres Weibchen stammt von Madeira. Unter diesen drei Belegen befindet sich ein Etikett von F. Smith („new sp.“). Er war wahrscheinlich der Erste, der entdeckte, dass es sich bei der auf Madeira vorkommenden *Micrandrena*-Art um eine neue Art handelt.

Der Verbleib der beiden Männchen der Typenserie, die von A.E. Eaton gesammelt wurden (COCKERELL 1922), ist unbekannt.

Ein von Frau W. Porter Cockerell im Jahr 1921 gesammeltes Weibchen von Porto Santo ist in der Erstbeschreibung von COCKERELL (1922) ebenfalls erwähnt und gehört zur Syntypen-Serie. Dieser Beleg befindet sich im National Museum of Natural History of Washington D.C. (USNM) und wird durch Fotobelege dokumentiert. Das von Frau W. Porter Cockerell im Jahr 1921 gesammelte Weibchen wird nun als Paratypus von *A. dourada* geführt.

Exemplare von *A. wollastoni* wurden von dem österreichischen Zoologen Georg von Frauenfeld während der Novara Expedition im Jahr 1857 auf Madeira gesammelt und von SICHEL (1868) als *A. minutula* determiniert. Diese Belege befinden sich in den Sammlungen des Naturhistorischen Museums von Wien (NHMV). Cockerell hatte von ihrer Existenz keine Kenntnis. Der Zweite, der

entdeckte, dass es sich bei der auf Madeira vorkommenden *Andrena*-Art um eine neue Art handelt, war wahrscheinlich der deutsche Dipterologe T. Becker. Er sammelte im Jahr 1904 ein Männchen und ein Weibchen. Die Belege befinden sich beide in der Sammlung des Biologiezentrums des Oberösterreichischen Landesmuseums Linz (OLML). Sie sind handschriftlich mit einem Etikett "*Andrena* spec nov." versehen. Es folgte keine Erstbeschreibung. Das Weibchen wird mit Etiketten hier fotografisch dokumentiert.

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