

## ***Species or Species concept - what's in a name?***

The new BWARS list of aculeate names calls itself a species concept list, rather than a species list or checklist. Why the change in name?

A name applied to a specimen in your collection has been so done because it matches a description given in a key. The implication is that this description relates to the very first specimen - the **type** - which was ever described for that species. Your specimen is therefore assumed to be the same species as the type. The name of the first person to make this description - the **author** of the species name - is properly written after the name, together with the date of that description.

However, the relation of your specimen to the type is very rarely a direct one, with several assumptions being made along the way. The nature of these assumptions has major implications for the verification and use of data such as that collected by BWARS members. Above all it is extremely unlikely that your specimen will ever be matched back to the type. It will only be named via an intermediary, for example the key which you used. It is important to understand that names used for insect species have changed over time, together with the interpretation of the types and hence the names used in different keys.

To illustrate this consider the recent discovery of *Nomada facilis* as a British species (Notton and Norman 2017, Hawks-Beard Nomad Bee, *Nomada facilis*, new to Britain (Hymenoptera Apidae. Br. J. Ent. Nat. Hist., **30**: 2017) This bee was recognised as being distinct from what is now known as *Nomada integra* by Schwarz in 1967. However it has only now (2017) been recognised amongst specimens collected in the British Isles.

The *Nomada* bee attacking *Andrena humilis* and which now appears in species lists as *Nomada integra* (described by Brullé in 1832) was known during the mid 20<sup>th</sup> Century as *Nomada pleurosticta* (described by Herrich-Schäffer in 1839) and appears as such in Paul Westrich's

important 1989 book *Die Wildbienen Baden-Wurtembergs* which was often used as a source of 'up-to-date' names for bees at the time of its publication. However, for British entomologists at the time the most modern key was that by R.C.L. Perkins *The British Species of Andrena and Nomada*, written in 1919. Here the same specimen would have been named as *Nomada germanica* (described by Panzer in 1799). This name is now considered to be a synonym (shared name, but described at a later date) of *Nomada fabriciana* (described by Linnaeus in 1767), a completely different species! Even earlier, Saunders in 1896 used the name *Nomada ferruginata* (described by Linnaeus in 1767). This name is now considered to be the one for the *Nomada* which attacks *Andrena praecox*.

Clearly each of these keys had their own interpretation of the published descriptions of the types, it is unlikely that every key was referenced to the actual type of each species. Indeed, the actual type specimen may even have been in such a poor condition that interpreting the published description against the type specimen may itself have been fraught with difficulty.

All this confusion is listed in a typical check list in the rather bald entry: *Nomada integra* Brullé, 1832

Nomenclature:

*ferruginata* misident (= misidentified)

*germanica* misident

*pleurosticta* misident

*stigma* misident

*cinciventr* Friesse, 1921 (= synonym)

(From Else et al. 2017, Checklist of the British and Irish Hymenoptera - aculeates (Apoidea, Chrysoidea and Vespoidea. (<https://bdj.pensoft.net/articles.php?id=8050>). It is an example, other checklists are similar.)

From this it can be seen that there are even more potential names which have been used. This list, however, carries no further information on where they have been used (and sometimes not even the genera under

which they were used). From the detailed history of the use of the name it is clear that what the specimen would have been known as depends entirely on the key which was used to name it with.

Using a **species concept** approach, where the name is matched with the name of a well-used key or publication to use this name (this is, inevitably, a largely regional and historical match), carries this key-related information with the name. That it is the name used *in the sense of* is shown by using : iso. source : year, where the source is the origin of this use (ideally a journal article or, if not available, a key) and year is the year of publication.

The species concept list (for a specimen identified with keys/literature available to a British entomologist) reads:

*Nomada integra*: iso. Notton and Norman: 2017 (these are records where the identity of the bee has been checked using Notton and Norman, or an equivalent key which is also considered to separate these two species accurately.

*Nomada integra* aggregate: iso. Notton and Norman: 2017 (for records which have NOT been separated using this paper, these might contain both the proper *Nomada integra* and *Nomada facilis* (both iso Notton and Norman 2017) Generally these will only have been determined around the date of publication of this resolution, otherwise they would be known under the BWARS interpretation below)

*Nomada integra*: iso. BWARS: 2017 (for records submitted as *Nomada integra* prior to the publication of Notton and Norman in 2017)

*Nomada cinciventr*: There is currently no iso assigned to this name, as there are no known taxonomic confusions. An iso will be added if a) a confusion is encountered or b) someone finds a source and year of understanding.

*Nomada ferruginata*: iso. Saunders: 1896

*Nomada germanica*: iso. R.C.L. Perkins: 1919

*Nomada pleurosticta*: iso. Westrich: 1989

*Nomada stigma*: There is currently no iso assigned to this name, as there are no known taxonomic confusions. An iso will be added if a)

a confusion is encountered or b) someone finds a source and year of understanding.

The most modern correct usage of the name is at the top of the list, the rest are just alphabetical.

*Nomada facilis*: iso. Notton and Norman: 2017 is the species concept for records where the identity of the bee has been checked using Notton and Norman, or an equivalent key which is also considered to separate these two species according to the same parameters as Notton and Norman.

As above, records of *Nomada integra* (or any of its earlier names) which have not been checked against Notton and Norman must be placed in the *Nomada integra* agg.

### **Why make all the fuss about a name?**

This comes down to what to do when we, as BWARS, collate records from a wide range of sources. From the earlier discussion it can be seen that records of either of these bees may be submitted under several names, according to the keys or publications which have been used to supply that name. Records extracted from Victoria County Histories, compiled around the turn of the 20<sup>th</sup> Century are very unlikely to be with the 'modern' name of *Nomada integra*. However, we now know that even those records with the modern name may also be one of two species.

When records are submitted to the BWARS database one of the first things which happens is that they are put through a series of routines known collectively as the 'Checker'. As well as checking that they have a valid date and that the grid reference agrees with the vice-county (a very good reason for supplying both with a record), the Checker also checks whether there is any potential for multiple names and asks the person running the programme which name is meant in a modern context. Sometimes there is enough information in the record to make a good assessment, but sometimes it may be necessary to go back and ask the supplier of the record.

Once this is agreed the record is assigned to the concept relating to the name under which it was recorded. In the example, records where the specimens have been checked using Notton and Norman will be assigned to the name they are supplied with. Records which have not been checked will be assigned to ‘*Nomada integra* iso. BWARS: 2017’, which will be redirected by the system to *Nomada integra* agg.: iso Notton and Norman. This ensures that the most accurate version of the original record is stored, alongside the current understanding of the name. This will include all records where no voucher specimen is available for re-examination. This last step is not possible under a checklist system.

In conclusion it should be emphasised that both **types** and **species concepts** have a place in the correct naming of the specimens underlying records. A **concept** relates a record to an interpretation of a **type**.

The type system remains the way in which interpretations of a name can be checked back against, but this will be practically limited in the number of times this can be done. Good storage and labelling of types is essential, the lack of this over many years, plus the need to add information to the type descriptions as more is understood (for instance where one ‘species’ is shown to be two or more) lies behind much of the apparent confusion over naming.

The species concept, where a key or publication is taken as representing a time-related interpretation of the use of a name which does not require direct reference to the type, is what most of us do in our every-day recording. Adopting the species concept approach is merely recognising what actually happens and taking an approach in which this can be more efficiently recognised in the compilation and standardisation of large quantities of data - the BWARS dataset. As such a concept relates to recording the information about a specimen/observation, not the strict taxonomic identity of the type itself.