

FURTHER TAXONOMIC NOTES ON VESPINAE (HYMENOPTERA: VESPIDAE)

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Abstract—Lectotypes are designated for two species of Vespinae: *Dolichovespula arctica* (Rohwer) and *Vespula intermedia* (du Buysson). *Dolichovespula albida* (Sladen) is diagnostically distinct from *D. norwegica* (Fabricius), therefore it is a distinct phylogenetic species. This is also the case for *Vespula intermedia* versus *V. rufa* (Linnaeus).

Key words: *Vespula*, *Dolichovespula*, lectotypes, phylogenetic species concept.

INTRODUCTION

With the rejection of Holarctic species in Vespinae in recent years (Carpenter and Glare, 2010; Carpenter et al., 2012, 2015; Kimsey and Carpenter, 2012) it is necessary to stabilize the nomenclature of the Nearctic species, several of which had gone under the names of Palearctic species for many years (*cf.* Carpenter and Kojima, 1997). To that end, in the present manuscript lectotypes are designated for two species previously treated as synonyms of Palearctic species, and basic species concepts reviewed to support the recognition of another.

LECTOTYPES

Vespa arctica (Rohwer)

Vespa borealis; Lewis, 1897, Trans. Am. Entomol. Soc. 24: 171 (key), 174 (female, male; “United States, New York, Mt. Washington, British Columbia; Amherst, Mass.”). Misidentification.

Vespula arctica Rohwer, 1916, Conn. State Geol. Nat. Hist. Surv. Bull. 22: 642 (key; in subgenus *Dolichovespula*). Replacement name for *Vespa borealis sensu* Lewis.

Rohwer (1916: 642) stated that Lewis’ (1897) identification of *Vespa borealis* Kirby, 1837, was not correct and proposed a new name, *arctica*. This meets the availability requirement of Art. 12.2.1 of the Code (International Commission on Zoological Nomenclature, 1999). The type series of Rohwer’s name is defined under Art. 72.4.4 to be “the specimen or specimens denoted by that unavailable name,” that is, the material listed by

Lewis (Lewis’ name is unavailable following the examples given for Art. 72.7). Lewis (1897: 169) stated that he prepared his paper at the Massachusetts Agricultural College (now University of Massachusetts Amherst), and studied collections of the American Entomological Society (now at the Academy of Natural Sciences of Drexel University), the Museum of Comparative Zoology, and a Prof. Lintner. In the Academy of Natural Sciences there are three queens and one male with locality label “B. Col.” and without date. One of the females also has a handwritten label “Vespa no. 27,” and all the females have identification labels by M. E. Archer, 1984, as *Dolichovespula adulterina arctica* (Rohwer), while the male has a label in an unrecognized hand as *Vespa adulterine* var. *arctica* Rohwer. The locality matches one of those given by Lewis, and to judge from the verdigris on the pins the specimens are from the 19th century, hence these specimens may be inferred to have been seen by him.

I have added a lectotype label to the least damaged female, which is the one with the “Vespa no. 27” label. The right flagellum after the first flagellomere is gone, and the right foreleg is present but has been partly displaced by verdigris, but otherwise the specimen is intact. I have attached paralectotype labels to the other “B. Col.” specimens. One of the females is missing the metasoma, while the other has the mesosoma smashed in at the pin; the male is missing the right antenna and part of the left flagellum. There is another female that may be from the same series, but it has no locality label, so I have not labeled it as a paralectotype.

It should be mentioned that Lewis (1897) referred only to white markings in his description,

but these specimens have the markings pale yellow. Replacement of white by yellow in the markings is well known in the Cordillera in this species (Bequaert, 1932; Miller, 1961), hence Lewis presumably based his written description on Eastern specimens, at a later date after seeing the British Columbia specimens.

Vespa intermedia (du Buysson)

Vespa rufa var. *intermedia* du Buysson, 1905 (1904), Ann. Soc. Entomol. Fr. 73: 499 (key), 591, female, male - "Mandchourie, région du lac Hanka ... ; Amérique du Nord: Hudson's Bay" (Paris?, London).

I found no specimen in Paris, just a header label with the name and a pinned label with ♀, Hudson's Bay, and British Museum.

In London there is a queen labeled with a red circle "Type," a circle reading "Hudson's/Bay" and on the reverse "44/17" [This last is not very legible, but see below], a rectangle with "Hudson's/bay territory/N. America," a label with "*Vespa rufa* L./var. *intermedia*/♀ Buys./R. DU BUYSSON det. 1903" [The date is overwritten by hand over a printed 1898], a label "Type of *Vespa rufa*/var. *intermedia* du Buys./selected by Bequaert/1931, Ent. Am. 12: 98" and a label "B.M. TYPE/HYM./18.948."

Bequaert (1932: 98) did not actually designate a lectotype, stating only "I propose to select Hudson's Bay as the type locality, since I believe that du Buysson's specimen from Lake Hanka, in Manchuria, actually belonged to the var. *schrenckii*. Unfortunately R. du Buysson does not say whether the North American specimen (which is at the British Museum) was the queen or the male." Evidently then he did not actually see the London specimen, which was apparently labeled by someone else, probably Yarrow, as suggested by Dr. Gavin Broad and as comparison to Yarrow's unpublished notes shows.

Du Buysson (1905) did not say how many specimens he saw, only that there were both female and male (by describing them), and giving the two localities; he only gave collector and year for the Manchurian specimen[s] in Paris but not for the Canadian specimen[s] in London. In fact there is a second specimen in London with the circular "Hudson's/Bay" label, with the same "44/17" on the reverse; it also has a yellow circle "Para-/type," a rectangular "Hudson's bay/Terri-

tory/N. America," a label with "*Vespa rufa* L./var. *intermedia*/♂ Buys./R. DU BUYSSON det. 1903" [overwritten over 1898], a label "Allotype *Vespa rufa*/var. *intermedia* Buys./selected by Bequaert/1931, Ent. Am. 12: 98." This specimen is a worker, not a male. It is badly damaged, with the left forewing gone, the dorsum of the mesosoma smashed in so that the propodeum is split, the metasoma smashed in on the right side into the venter, the left mid tarsus gone, the left hind tarsus with only three basal tarsomeres, the right missing apex of femur and remaining segments, and the left antennal flagellum after first flagellomere glued back on but missing one basal flagellomere. Nevertheless, the right antennal articles can be counted and the metasomal segments, and it is a female, mistaken by du Buysson. The apex of the metasoma is open but nothing can be seen. But aside from the number of antennal articles and metasomal segments, the antennae are short, especially the apical article, and the terminal metasomal segment pointed not rounded. Hence the male genitalia to which du Buysson refers must have been dissected from a Manchurian specimen or another specimen in Paris.

Besides these two specimens, there are one queen, one worker and two males from the same series, with the circular Hudson's Bay label and "44/17" on the reverse. The males lack terminal metasomal segments and genitalia. The queen has the termini including the sting mounted on a point (glued on tip). Only the queen has a determination label, and only the word "intermedia," while on the reverse side is "nr saxonica" which is crossed out. This does not really look like du Buysson's handwriting. Hence it is possible he did not see these specimens, otherwise he would have figured out the castes.

I have added a lectotype label to the queen definitely seen by du Buysson, and now publish the designation.

Archer's (1981) key to subspecies of *rufa* runs *intermedia* and *schrenckii* out together by pale markings whitish yellow, then separates them by red on metasomal segments I and II in *intermedia* but not lateral whitish spots on II vs. either not red or red with lateral whitish spots on II in *schrenckii*. Archer (1997) rejected all of this when synonymizing *intermedia* with *schrenckii*, but did not mention the whitish spots, giving detail only on the red markings, for which he described

variation in both *intermedia* and *schrenckii*. Yarrow's unpublished notes describe the fine points or micropoints of East Asian (Amur) specimens of *rufa* being much finer than specimens from Hudson Bay (*intermedia*), on the pronotal lobe, mesonotum and scutellum, so that these are more shining, while the points are much stronger and denser in *intermedia*, so that sclerites are much less shining. There appears to be a subtle difference in specimens I have examined.

PHYLOGENETIC SPECIES

Vespa albida (Sladen)

Vespa marginata Kirby, 1837, Fauna Bor.-Am. 4, Ins.: 265, pl. VI fig. 2, female - [Canada] "Taken in the Route from New York, and again in Lat. 65°" (type depository unknown). Junior primary homonym of *Vespa marginata* Gmelin, 1790.

Vespa albida Sladen, 1918, Ottawa Nat. 32: 71, male, female - [U. S. A.] "Alaska" (lectotype male Ottawa).

In an unpublished Master's thesis, which has now been cited a couple of times on Google Scholar, Persson (2015) presented data for five loci, viz. 28S, COI, EF1a, Pol II and WG. From her analyses, solely using model-dependent methods, she concluded (p. 2) "In the case *Vespula rufa* and *Vespula intermedia* respectively *Dolichovespula norvegica* and *Dolichovespula albida* our data does [sic] not support that they have diverged." Despite noting that Carpenter et al. (2012) had documented morphological differences in male genitalia between *D. norvegica* and *D. albida*, she stated (p. 28) "There is no phylogenetic divergence between these specimens that supports them being two different species" and "The reason that they are morphologically different but genetically inseparable might be that they are in a very early stage of speciation or a recent mitochondrial introgression. How species are being separated is dependent upon the criteria being used for species delimitation and how important certain characters are. Is it enough with morphological differences when there is no molecular difference?" She concluded (p. 28) "We suggest that *D. albida* (Sladen, 1918) should continue being treated as a synonym of *D. norvegica* (Fabricius, 1781)." For *V. inter-*

media vs. *rufa*, where the difference is in microsculpture (see above), she stated (p. 28) "The divergence is small or non-existent, depending on locus, which means that *V. rufa* and *V. intermedia* appear to have been separated only a short time period, if at all. The species delimitation is only based on colour variation and we therefore rather suggest that *V. intermedia* should continue to be considered a synonym of *V. rufa*."

The implicit assumption that five molecular loci must capture the divergence between species is perhaps not surprising for a molecular biologist, but it certainly reveals ignorance of the concept of mosaic evolution. More to the point, the author is completely unaware of the phylogenetic species concept. The author stated nothing about species concepts; as far as may be inferred from the quotations given above, if any concept at all, she held a rather phenetic species concept. But as stated by Nixon and Wheeler (1990) in their review of the phylogenetic species concept, a species is "the smallest aggregation of populations (sexual) or lineages (asexual) diagnosable by a unique combination of character states in comparable individuals (semaphoronts)." The yellow-jacket species in question having been diagnostically separated are then validly recognized as phylogenetic species, and I have followed that practice in vespid taxonomy for decades (e. g., Carpenter, 1988, 1996, 2003; Carpenter and Kojima, 1997; Carpenter and van der Vecht, 1991). It does not matter for this concept whether some randomly chosen genes do or do not show divergence. Nor does it matter if some of the trees for the molecular samples show sequences from one species nesting inside sequences of another species - the concepts of monophyly and paraphyly do not apply to species, rather to groups of species. Under the phylogenetic species concept, "the symplesiomorphic retention of actual or potential interbreeding is neither alarming nor surprising" (Nixon and Wheeler, 1990: 217). This is all well established in the cladistics literature, to which perhaps molecular biologists ought to refer before presuming to comment on "Phylogeny and taxonomy."

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