# A genus of European paper wasps revised for the first time using integrative taxonomy

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Female of the paper wasp species *Polistes dominula* on its nest. Credit: Gerd Reder

The European and Mediterranean species of the paper wasp genus

Polistes were recently revised by scientists at the SNSB-Zoologische Staatssammlung München (ZSM).

For the first time for this group scientists applied an integrative taxonomic approach which combines traditional morphological methods with modern DNA barcoding.

As a result, the researchers were able to identify a new species from Morocco. For this well-researched wasp group, this is an actual sensation.

The study is published in the open access journal *ZooKeys*.

The Munich researchers analysed more than 260 wasp specimens collected from across the study area with the help of DNA barcoding.

They managed to identify all species and determine their distribution. In addition, based on the genetic data, they were able to evaluate morphological characters for each species and created a completely new key for identification.

The wasps of the genus Polistes belong to the family Vespidae. The genus is represented by 17 species in Europe and the Mediterranean, with four species occurring in Germany. Within the genus, 13 species are social, with the queen overwintering and founding a new nest with up to 200 workers. Four species are parasitic and have no workers.

Although Polistes has been well-known in Central Europe for more than 200 years, knowledge of Mediterranean species has so far been scarce. Many species of the genus exhibit only subtle morphological differences and show high levels of colour variation, further complicating their identification.

An important result of this research is the separation of species of the *Polistes gallicus* species complex into three distinct species. Moreover, the genetic data led to the discovery of a new species, represented by a single specimen from the High Atlas Mountains in Morocco. This was an unexpected result for the researchers. The species was named *Polistes maroccanus*.

Another very surprising result was the discovery of high levels of genetic variation within Polistes dominula, a species commonly found in Central Europe, indicating the presence of up to three different and hitherto unrecognized species - a case requiring further investigation.

Integrative taxonomy is an approach that combines different scientific methods to reliably differentiate species. In particular, DNA barcoding has proven to be a useful technique for the identification of species and for the discovery of new species. The method allows to identify most species quickly and accurately, even those species that are difficult to identify using traditional methods based on morphological characters.

DNA barcoding uses a short gene fragment that differs in almost all species worldwide. The sequences are stored in an online database and can be used for identification. The method derives its name for being reminiscent of the barcodes similar to those found on products in supermarkets that allow quick and error-free identification at the checkout.

DNA barcoding is part of a global research initiative led by the Canadian scientist Paul Hebert from the University of Guelph. The ZSM is a project partner and involved in assembling DNA barcodes of the German animal species. In addition to ZSM researchers, scientists from Switzerland and the Netherlands contributed to the Polistes project.

**More information:** Christian Schmid-Egger et al, Revision of the

West Palaearctic Polistes Latreille, with the descriptions of two species – an integrative approach using morphology and DNA barcodes (Hymenoptera, Vespidae), *ZooKeys* (2017). DOI: 10.3897/zookeys.713.11335