

## News and views on Italian Odonata revealed by DNA barcoding

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### Abstract:

Italy, due to its geographical location and geological history, is considered a biodiversity hot-spot for many groups of animals and plants. Despite that, large knowledge gap still exists, not only for elusive or little known animals but also for well known organisms with high charismatic value or high conservation value. One of these is represented by the insect order Odonata. Although they are considered good bioindicators of freshwater quality and in spite of the relatively low number of species, some areas of particular biogeographical interest (e.g. Italy) are still neglected in terms of their knowledge. In Italy (and annexed islands), there are 89 species of Odonata (32 Zygoptera, 57 Anisoptera) out of a total of 138 in Europe, making this country extremely important for the evolutionary radiation and conservation of these insects. A concerning lack of information regards the availability of molecular records, which encompasses just a few nucleotide sequences in public databases (NCBI and BOLD System) representing only 11 species belonging to the Italian populations. Of these, only a small part is related to the mitochondrial DNA barcode region COI (658 bp), which is a standard reference in the modern (and integrated) taxonomy of metazoans able to recognize odonate species and to highlight inconsistencies between morphological recognition and molecular divergence. This phenomenon constitutes the so-called “alarm bells” or warnings, useful for deepening unpublished or unclear taxonomic aspects.

The purpose of this study was to create a dataset of samples and reference DNA barcoding sequences of Italian Odonata populations. The effectiveness of DNA barcoding in the identification of the sampled species was tested by using a multi-approach method of species delimitation, based both on genetic distance values and phylogenetic relationships at the terminal nodes level. In the case of discrepancy between morphological identification and molecular divergence, taxonomic warnings have been reported in order to identify complexes of species that need further investigation.

Besides having provided an important contribution from a molecular point of view, thanks to the characterization of the DNA barcoding of Italian Odonata, this project has further highlighted the importance of our territory as a center of diversification for these insects. The discovery of new molecular entities, which taxonomic status will be deepened in future studies, constitutes an upgrade of odonatological knowledge, not only for Italy but also for the entire Palearctic and Holarctic range of some species with consequent implications in terms of conservation.