Broadening the biodiversity catalogue of spider populations in the Iberian Peninsula

December 19 2018

The scientific team has studied a total of 20,539 samples of different Iberian spider species. Credit: Marc Domènech (University of Barcelona)

The biodiversity catalogue of Iberian Peninsula spiders now includes a dozen new species from seven newly discovered families mainly found in soil, according to an article led by Professor Miquel Àngel Arnedo from the Faculty of Biology and the Biodiversity Research Institute (IRBio) of the University of Barcelona.

The new study, covering the largest study area on this animal group in peninsular territory, is now published in the journal *Biodiversity Data Journal*. The scientific team studied a total of 20,539 samples of Iberian spider species, with 8,521 adult specimens corresponding to 190 genera, 39 families and 376 species in the oak woodlands of national parks in Aiguestortes i Estany de Sant Maurici, Ordesa i Mont Perdut, the Peaks of Europe, Monfragüe, Cabañeros and Sierra Nevada.

These forests with temperate climates, where arboreal species and deciduous trees are abundant, represent the most appropriate natural habitat to study the biogeographic patterns of spiders at a peninsular scale, according to Professor Miquel Àngel Arnedo. "In a broader sense, oak woodlands are a few of the forest communities that are represented in all National Parks building up our study. These are natural habitats of interest regarding conservation, and show a high level of endemism and their evolutionary history is quite well known," he says.

The geographic distribution of Iberian spiders is still poorly understood compared to other Mediterranean countries. "The lack of tradition in natural history studies in the country and the fewer admirers of arachnology could explain these differences," says Arnedo, member of the Department of Evolutionary Biology, Ecology and Environmental Sciences of the Faculty of Biology and IRBio.

The research team found 11 new spider species apart from other 20 species whose taxonomic identification is still pending. So far, more than 1,300 species were known in the peninsula and the Balearic Islands.

According to the experts, some of the new species could be especially vulnerable to environmental factors (in most cases, only one or a few individuals have been discovered in one geographical place or even one parcel).

Moreover, the experts added seven new spider species to the peninsular biological inventory, and three more in the Spain inventory, with the identification of species such as Dictyna pusilla, Philodromus buchari, Pseudeuophrys nebrodensis, Euryopis flavomaculata, Titanoeca schineri, Dipoena torva and Sardinion blackwalli, some of them described in the scientific bibliography since the late 19th century. "None of these species can be considered rare, since they had been identified in other places such as France, Portugal and Central Europe," says Arnedo

"There are still many spider species to be found," adds Arnedo. "These results show there is a lack of systematic samplings in the arachnological biodiversity in Spain and are a good example of the few things we know about our own fauna."

Reconstructing the evolutionary history of peninsular spiders

The sampling technique for spider specimens in the natural environment has followed the standardized protocol COBRA. This methodology, applied in studies of terrestrial arthropod communities worldwide, enables researchers to create an inventory of the species in a specific area and brings data to extrapolate the amount and abundance of species that can live in a geographical area.

Moreover, the methodology based on content such as DNA barcoding—the use of a short and standardized DNA fragment as the identifier of a species—speeds up the identification of species and

improves the resolution of the analysis of biodiversity in this animal group. "This methodology enables developing high-resolution bioinformatic tools to help automatizing the classification and identification of species, even in populations of the same species in different places," says Arnedo.

"For instance, young individuals cannot be classified as species through morphological criteria, as in many cases, they only reach the family taxon. With DNA barcoding, we can categorize them under specific species. This technique also helps to identify different vital stages in the same species—even remains such as exuvia or overlayers, excrements or environmental DNA that would be impossible to distinguish otherwise.

Loss of natural habitat, invasive species, environmental pollution and global warming are threats that put the conservation of peninsular arachnological fauna in danger. Some spider species tolerate environmental perturbations better than others, but other groups are more sensitive to environmental factors. In the future, samplings will need standardized protocols and wider taxonomical data with nuclear molecular markers. Morphological studies and ecological information are required to know about the evolutionary and biogeographic history of peninsular spiders and to guarantee their conservation.

"Like other organisms, spiders are exposed to variations in their environmental and biological environments. We are all in the same boat, and with the same destination. Te difference is that we are the in charge of this destiny," concludes Professor Miquel Àngel Arnedo.

More information: Luís Crespo et al, A DNA barcode-assisted annotated checklist of the spider (Arachnida, Araneae) communities associated to white oak woodlands in Spanish National Parks, *Biodiversity Data Journal* (2018). DOI: 10.3897/BDJ.6.e29443

Provided by University of Barcelona