Convocatoria de ayudas de Proyectos de Investigación Fundamental no orientada

TECHNICAL ANNEX FOR TYPE A or B PROJECTS

1. SUMMARY OF THE PROPOSAL (the summary must be also filled in Spanish)

PROJECT TITLE: LEAF LITTER FOOD WEBS ACROSS RAINFALL GRADIENTS

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SUMMARY
(brief and precise, outlining only the most relevant topics and the proposed objectives):

Food webs are representations of 'who eats whom' in natural ecosystems. Unlike aquatic food webs, we currently lack accurate quantitative data describing complex terrestrial food webs (i.e. > 10 species). For instance, connectance –the number of links per species- and interaction strengths –the degree to which a population affects another- have not been convincingly solved for any terrestrial food web. Since these parameters are central to understand the robustness and the stability of these ecological networks, and since the above dynamic properties are very important for conservation biology, solving terrestrial food webs is an urgent and necessary task. Here, we propose to solve an important food web module within the beech forest leaf-litter food web: that of the meso- and macroarthropods. Furthermore, using field enclosures, we will test how the removal of highly-linked keystone predators (either spiders or Lithobiomorpha centipedes) may affect these food web properties and whether cascading extinctions occur. In addition, by setting the above experimental units in locations with either high (>1500mm/year) or low (<1300mm/year) rainfall we will test how the food web response changes depending on water availability and how the interaction between food web properties and rainfall affects an ecosystem process: the rate of leaf litter decomposition. Since in the coming years rainfall is expected to decrease within these Iberian ecosystems, solving the web in a rainfall gradient will allow us to make predictions on how the food web will change with global warming and the subsequent decrease in water availability in these areas. To solve the food web we propose a multidisciplinary approach. First, we will use a novel three-step procedure to estimate interaction strengths in the field: 1) calculating species densities by sifting leaf litter, 2) studying "who eats whom" in field microcosms and 3) estimating the probabilities of encounter among interacting species by using pitfall trap catches. Second, for target species pairs, we will validate the above estimates of interaction strengths, by correlated them with those calculated from a) molecular techniques (i.e. DNA barcoding) and b) those arising from experimental manipulations of litter fauna. Lastly, we will frame these results within the current theory that is being developed in our group on a) Abiotic-dependent diversity gradients and b) The role of phenotypic variation in food web structure and dynamics, which, along with previous findings, allows us to make specific predictions: 1) Top-down effects, interaction strengths and instability should be more pronounced in drier sites, and 2) Bottom-up effects, connectance, cascading extinctions after predator removal and phenotypic variation of traits that determine trophic interactions, should increase in rainy places.