

# Ancient trees help to protect an endangered species

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The longest-lived trees in the Pyrenees facilitate the survival of wolf lichen, a species threatened throughout Europe. Credit: Ot Pasques

The oldest trees in the forest help to prevent the disappearance of endangered species in the natural environment, according to a study led by the University of Barcelona. This is the case of the wolf lichen—threatened throughout Europe—which now finds refuge in the oldest trees in the high mountains of the Pyrenees.

A [study](#) published in *Proceedings of the National Academy of Sciences* reveals for the first time the decisive role of the oldest trees in the conservation of other living beings thanks to their characteristic and unique physiology.

Conserving the oldest trees in forests will be essential to protect biodiversity in forest ecosystems, which are increasingly affected by the impact of global change. The study was conducted by Sergi Munné-Bosch and Ot Pasques, from the Faculty of Biology and the UB Biodiversity Research Institute (IRBio).

## **When old trees are life shelters**

The wolf lichen (*Letharia vulpina*) is a species with a very limited distribution that is prevalent in mature forests and long-lived trees. Native to the American continent, it has also been found in Europe and the Iberian Peninsula, in medium and high mountain areas. Now, the authors have discovered that the presence of this lichen in the Pyrenees is associated with the longest-lived trees, specifically the black pine (*Pinus uncinata*).

"These old trees are found in the most isolated places, they grow on rocks with very little substrate and show unique characteristics regarding structure and composition. Specifically, the black pine can even live for more than a millennium, and its decay would be the most important factor facilitating the presence of the lichen," says Professor Sergi Munné-Bosch.

"Paradoxically, the worse off these trees are, the more useful they are for the ecosystem (lichen conservation). In other words, the less important they might seem as individuals because of their decline, the more important they are for the whole ecosystem," says Munné-Bosch, cited as one of the world's most influential experts in the Clarivate

Analytics' 2023 list.

The best habitat for the survival of the lichen *L. vulpina* is the [oldest trees](#) in the forest, the authors note. "In the case of centenarian and millenarian trees, the simplicity of their development, the modular growth that allows them to respond better to injury and damage, and the high tolerance to extreme conditions (water stress, extreme temperatures, etc.) are factors that explain their great longevity in the natural environment," explains Ot Pasques, an expert from the UB's Department of Evolutionary Biology, Ecology and Environmental Sciences and IRBio.

"Trees have survival limits in extreme conditions, but they can survive with little water and nutrient resources. They are able to survive [extreme conditions](#) and live longer, thanks to modular growth and compartmentalization of the damage that can affect them," says Munné-Bosch. "Slow growth, which is associated with stress responses—such as the typical cold of high mountains or drought, which is increasingly frequent in the summer—also favors the longevity of these trees."

## **The most majestic trees, threatened by the human footprint**

Longevity is one of the biological keys that would explain the unique ecological functions of trees, which make it essential to protect species and older trees in the most isolated mountain regions.

"All individuals of a population are indispensable not only for their particular population and species, but for the whole global ecosystem. Everything is closely interconnected, and even the decline and death of trees plays an essential role in conserving biodiversity and ecosystems," says Munné-Bosch.

These giants of the forest are threatened by the human footprint, especially the felling of trees. "Environmental conditions are not a problem for these trees, but unfortunately we as a species are. Only with a deep respect for nature and the life of other living beings can we preserve the extraordinary longevity of these trees. And as we have found in this study, this will also be decisive for the preservation of all biodiversity as we know it today," the researchers conclude.

**More information:** Ot Pasques et al, Ancient trees are essential elements for high-mountain forest conservation: Linking the longevity of trees to their ecological function, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2317866121](https://doi.org/10.1073/pnas.2317866121)

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