Scientists view old-growth forests through lichens to understand value

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Dr. Troy McMullin, left, and Dr. Yolanda Wiersma examine Lungwort Lichen on a tree during a survey for lichen diversity in Kejimkujik National Park, Nova Scotia, in an undated handout photo. Two scientists say defining the biodiversity of a forest by the age of the trees is an oversimplification because it does not take into account the richness of the species in a forest, but lichens can provide a deeper understanding of a woodlands' ecosystem.Troy McMullin, a lichenologist at the Canadian Museum of Nature, said lichens "are kind of like the coral of the forest or the canaries in the coal mine." The fungi are sensitive to the smallest changes including pollution, humidity or the amount of light being received, which makes them strong indicators of a particular environment, he said. There are some lichen that are "intolerant to disturbance" and are usually found in old-growth forests, which McMullin and Yolanda Wiersma at Memorial University of Newfoundland want to study to determine the age of an area. Old trees don't always equate to old forests, McMullin said. "We use the term old-growth forest a lot. But what does it mean exactly? There isn't a clean definition," he said. In the United Kingdom, there are forests designated as "ancient woodlands" that are not characterized by the presence of large, stately, old trees but rather by the length of time they have existed as woodlands, says a paper written by McMullin and Wiersma that was published this week in the Ecological Society of America journal, Frontiers in Ecology and the Environment. "What we're trying to show here is that it doesn't matter how old the trees are," he said. While they advocate that no old-growth forests should be "cut at all," McMullin said they realize it's not as simple as that. "So if we're going to do this we should identify those that have the most unique biodiversity. And lichens are one of the best indicators because they are so sensitive," he said. "It's only these lichen that live in these old forests that make it special and that tends to happen when forests haven't been disturbed for a long time. It's not about how old the trees

are, it's about how long there's been a forest on that site." Studying lichen that can only be found in a particular site will help determine the age and biodiversity of a forest, he said. Lichens are found on every continent and can grow on trees in frigid polar regions and harsh deserts. They are usually the first life form to grow on bare rock following a volcanic eruption. Some lichens look like leaves while others hang down like hair, and others grow into the bark becoming part of it almost like a crust on a tree, he said. "Lichen is fungus that has learned how to farm," he said. "It's just a fungus but its transformed itself into a greenhouse and it has algae inside of it. The algae is … producing carbohydrates and sugars and it's actually feeding the lichen." Wiersma, a landscape ecologist, said research has shown that certain types of lichen are specific to forests that have been continuous for a long time, and it is these fungi that scientists need to look for. Lichens are not just an important food source for caribou, insects and slugs, but birds use it to build their nests because of its disinfectant properties, she said. They also prevent soil erosion by growing on it, Wiersma added. The biologists said the fungi are already being used to assess old-growth value in parts of Europe, and they want to start by building a list of lichen seen in different forest types. Conserving biodiversity in forests is important, Wiersma said. "If we lose it, we can't replace it," she said. "That diversity of life and species is there because that place has been a forest for hundreds and hundreds of years and you just can't replant and replace that full suite of biodiversity."

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