# New Zealand team finds early plant arrivers dominated landscape

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(PhysOrg.com) -- It seems intuitive that not all plant species could have taken a foothold on land at the same time all those millions of years ago as conditions on Earth evolved to the point where they could survive; some had to come first, which means of course, that some had to come after. But did the order in which they arrived make any difference in how those plant species evolved? Or to put it another way, did the plants that arrived first enjoy an advantage that has survived to this very day? Dr William Lee and his colleagues from Landcare Research in New Zealand thought the idea seemed plausible, so they set themselves the task of finding out. As it turns out, as the team describes in their paper published in *Biology Letters*, those that arrived first, did appear to take advantage of their status and flourished, leaving those that came after to carry on in less dominant roles ever since

To come to these conclusions the team took samples of plants from 262 different areas in the mountains of New Zealand. They then made age estimates of 17 genera using molecular analysis and other means to estimate how many of each were present in the given area and how much ground they covered, or dominated, in the place where they lived. They also noted the mountainous location was ideal because plants in the area would have survived the last ice age, allowing for tracing back their original origins approximately ten million years.

After analyzing all the data, the team found that those plant species that had arrived first developed in ways that allowed them to dominate the areas in which they lived even as other species arrived. The first arrivers

grew taller, for example, leaving those that came after to exist as smaller species. And because of this, they were also able to take up more of the available space, meaning more of them lived in any given area than did any other species; and that arrangement has lasted through the years.

The team notes that while other environmental factors such as soil conditions, temperature variations and average rainfall, most certainly play a part in which species are able to thrive over time in any given area, those that came first, and found the conditions hospitable, held the advantage over millions of years, and don't seem likely to cede it any time soon.

**More information:** Plant radiation history affects community assembly: evidence from the New Zealand alpine, *Biology Letters*, Published online before print February 8, 2012, doi: 10.1098/rsbl.2011.1210

**Abstract**
The hypothesis that early plant radiations on islands dampen diversification and reduce habitat occupancy of later radiations via niche pre-emption has never, to our knowledge, been tested. We investigated clade-level dynamics in plant radiations in the alpine zone, New Zealand. Our aim was to determine whether radiations from older colonizations influenced diversification and community dominance of species from later colonizations within a common bioclimatic zone over the past ca 10 Myr. We used stem ages derived from the phylogenies of 17 genera represented in alpine plant communities in the Murchison Mountains, Fiordland, and assessed their presence and cover in 262 (5 × 5 m) vegetation plots. Our results show clear age-related community assembly effects, whereby congenerics from older colonizing genera co-occur more frequently and with greater cover per unit area than those from younger colonizing genera. However, we find no evidence of increased species richness with age of colonization in the alpine zone. The data

support priority effects via niche pre-emption among plant radiations influencing community assembly.