Phylogeny of Chaetanthera (Asteraceae: Mutisieae) reveals both ancient and recent origins of the high elevation lineages

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Penalized likelihood analysis of previously published chloroplast DNA (cpDNA) ndhF sequences suggests that the central-southern Andean genus Chaetanthera diverged ca. 16.5 million years (my) ago, well before the uplift of the Andes to their present heights. Penalized likelihood analysis based on new nuclear ribosomal DNA (rDNA) internal transcribed spacer (ITS) sequences indicates that the most relictual lineages occupy high elevation Andean habitats that did not exist until some 10 my later. This result is contrary to the expectation that younger habitats should be occupied by phylogenetically younger lineages. The results are interpreted with respect to the development of aridity in lowland habitats during the Miocene and Pliocene, which presumably extinguished the lowland relatives of the high elevation taxa or, in effect, forced them upwards in search of adequate moisture. As the more northerly lineages were being displaced upward, others diversified in the mediterranean-type clima