Hybridization capture of Larix candidate adaptive genes from sedimentary ancient DNA.

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Siberian larch forests dominate large areas of northern Russia and contribute important roles for the world’s ecosystem. In order to understand the past dynamics of larches and their adaptive genetic variation, sedimentary ancient DNA (sedaDNA) extracted from lake sediment cores is a crucial source of genetic material. The difficulty of retrieving extremely rare DNA sequences from samples reaching back up to 25000 years in age, is challenging. Previous studies (Schulte et al.) showed that the hybridization capture allowed an enrichment of targeted sequences by several orders of magnitude in comparison to shotgun sequencing method. Therefore, we established for the first time, a hybridization capture method targeting 65 candidate adaptive genes laying on the Larix nuclear genome. Our preliminary results showed the ability of our newly established method to enrich extremely rare DNA sequences of the targeted Larix candidate adaptive genes, which were not retrieved by shotgun sequencing method applied on the same samples. Furthermore, the results allowed to detect and compare specific nucleotide polymorphism of adaptive candidate genes among sedaDNA samples distributed in space and time. The establishment of this new method is laying the basis to investigate possible adaptive variation of larch species acquired across the dry and cold conditions of the Last Glacial Maximum (LGM); as well as their possible advantages or disadvantages in relation to the current environmental changes toward dry and warm conditions.