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A Genetic Revelation of Peopling of the Tibet Plateau

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ABSTRACT: As a high-altitude immense plateau surrounded by towering mountain ranges, the Tibetan Plateau was once considered to be one of the last populated areas of modern humans. However, this view has been tremendously changed by archaeological, linguistic and genetic findings in the past sixty years. Nevertheless, the time and routes of modern humans into the Tibetan Plateau remain controversial. We sampled 562 Tibeto-Burman inhabitants from nine different regions across the plateau to carry out high-resolution mitochondrial-DNA analyses. By examining the mtDNA haplogroup distributions and their principal components, we demonstrated that the maternal diversity on the plateau reflects mostly the northern East Asian component. Furthermore, phylogeographic analysis of plateau-specific sublineages based on 31 complete sequences revealed two primary components: pre-LGM (Last Glacial Maximum) inhabitants and post-LGM immigrants. Also, the analysis of one major pre-LGM sublineage A10 showed a strong signal of post-LGM population expansion and greater diversity in the southern part of the Tibetan Plateau, indicating the southern plateau as a refuge place when climate dramatically changed during LGM.

青藏高原现代人来源的遗传解读

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摘要: 青藏高原由于其极高的海拔、恶劣的自然环境、以及被一系列高大山脉环抱的地理特性, 曾一度被认为是现代人最后定居的地区。然而, 近60年来的考古学、语言学和遗传学的研究结果彻底否定了这种观点。同时对于青藏高原地区现代人的来源时间和迁徙路线还存在一定的争议。我们对青藏高原九个不同地区的现代人群体进行了全面的遗传样本收集。通过对这些样本的母系遗传物质-线粒体DNA的详细分析, 我们证实了西藏地区现代人类群体母系遗传成分主要与东亚北方群体类似。随后我们利用线粒体DNA全序列的系统分析发现西藏现代人的成分来源与末次冰期最高峰之前(pre-LGM)的居民和最高峰之后(post-LGM)的移民。同时, 一种特殊的线粒体单倍型A10, 显示出末次冰期之后强烈的人口膨胀信号, 并在高原东南部具有最高的频率和多样性。因此我们认为青藏高原东南部可能在末次冰期最高峰环境剧烈变化时是现代人群的“避难所”。