Fossilized plant matter points to desertification near Tibetan Plateau

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Roughly 22 million years ago, at the onset of the Miocene, the Tibetan Plateau started to lift upward. The rising land curbed the flow of moist air from the south, sparking the onset of central Asian desertification. Or, perhaps, the supposedly arid region to the northeast of the Tibetan Plateau harbored shallow lakes or wetlands until as recently as 8 million years ago, at which point the historical desertification was initiated by some other mechanism. The current debate between these two proposals, of either a 22- or 8-million-year-old onset of desertification, hinges, to a sizeable degree, on the history of the fine sediments of the Tianshui Basin in central China.

One line of research, which looked at grain sizes, rock magnetic properties, and bulk geochemistry, among other factors, suggested that the early Miocene sediments were transported to the Tianshui Basin by the wind. The existence of wind-borne sediment, known as loess, would support the 22-million-year desertification hypothesis. Other researchers, however, suggest that though many of the sediment properties are similar to loess, they also show a good match for lake bed or wetland material.

To discriminate between the two hypotheses, Peng et al. measured the chain length distributions of n-alkanes—a type of hydrocarbon found in waxy plant material—from preserved organic material found in Tianshui Basin sediment samples. Long n-alkane chains, those with 27–31 carbon atoms, mainly stem from terrestrial plants, while midsized chains, with 23–25 carbon atoms, derive from aquatic plants or wetland flora. The

authors find an abundance of the shorter carbon chains in the Tianshui sediments, an important difference from nearby loess samples. Supported by the observation of preserved pollen and algae, the authors suggest that the Miocene Tianshui Basin was a lake, mudflat, or floodplain region and not the arid loess hypothesized by some researchers.

More information: "Biomarkers challenge early Miocene loess and inferred Asian desertification", *Geophysical Research Letters*, doi:10.1029/2012GL050934, 2012

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