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## Grass development in the Amazon drainage basin, evidence from the fossil and phytochemical record

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The Poaceae (the grass family) includes over 11000 species and covers large part of the Earth land surfaces. Their history is rooted in the Cretaceous, but this group only expanded fully over the globe during the late Miocene. In the Amazon drainage basin (ADB) grasses were at the core of a heated debate, in which it was hypothesized that during the Pleistocene glacial periods grasses replaced vast extents of the Amazon rainforest. Although this hypothesis is now rejected, the history of grasses in the ADB still remains to be resolved. In this paper we propose a 3-staged model for grass development in the ADB: (1) from c. 23 to 9 Ma western Amazonia was dominated by a megawetland (the 'Pebas system') that harboured large amounts of (aquatic?) grasses; (2) from c. 9 Ma Andean uplift prompted megafan and fluvial environments on the Andean slopes and in the Amazon lowlands respectively, these environments created new settings for grass colonization; (3) from c. 5 Ma grasses were firmly established in the tropical alpine vegetation (páramo), the tropical lowland floodplains (várzeas), and savannas (cerrado). To test these scenarios we analysed Neogene and extant Andes-Amazonian grasses by means of Fourier Transform Infrared spectroscopy, we performed a Light- and Scanning Electron Microscopy analysis, and compared the results with existing biomarker data from the Neogene sediments. Here we report on the preliminary results that, among others, suggest that in the middle Miocene aquatic (C3) taxa were common in the Amazon lowlands. Although further study will have to confirm the precise nature of the ADB grass history, we anticipate that abiotic processes during the Neogene and Quaternary left a strong imprint in the grass phytogeography of northern South America.