LETTER

Paleoclimatic changes are the most probable causes of the rainforest crises 2,600 y ago in Central Africa

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In PNAS, Garcin et al. (1) describe a Late Holocene rainforest crisis (LHRC) between ∼2,600 and 2,000 calendar years B.P. in Lake Barombi (Southwest Cameroon) when tropical rainforest was replaced by savannah, as attested by a large peak in Poaceae pollen (30–40%), and correlated with a shift in the $\delta^{13}C$ organic carbon from −34 to −29 ‰ Pee Dee Belemnite (2). The authors use the isotopic composition of plant leaf waxes preserved in the sediments as an estimated independent paleoclimate recorder of precipitation (3). Indeed, climate and environment can broadly affect the deuterium/hydrogen (D/H) ratios of plant materials, but the degree to which different plant species' leaf wax D/H ratios are affected by these factors is not yet completely understood (4). Particularly, this is because new leaf production occurs mainly at the end of the dry season, suggesting leaf waxes capture an annually integrated signal of meteoric waters, with a slight bias to the late dry season (4). Another study (5) indicates clearly that leaf wax *n*-alkanes are synthesized only early in the ontogeny of a leaf, suggesting that these compounds record only a brief period of the environmental variability. Hence, interpretation of this environmental recorder should be taken with caution. However, Garcin et al. conclude that the LHRC was not primarily controlled by climate but caused by anthropogenic impact.

This conclusion is contradicted by the numerous archeological data for the beginning and also after the end of the LHRC (ref. 1, their figure 4B; refs. 6 and 7). At the time of the coring operations, several geological and pedological surveys were carried out across the catchment area of Lake Barombi (2). No archaeological remains were found, notably pottery shards and charcoal in the topsoil, providing evidence against anthropic settlements. On the other hand, it can be stressed that, during the 20th century, the population largely increased in south Cameroon to the north of the Yaoundé region without preventing a marked expansion of tropical rainforest (ref. 8, their figure 5).

These arguments clearly show that climate change was the primary control on the LHRC as previously proposed (2, 6, 7, 9, 10), indicating that the large-scale opening up of the tropical rainforest was linked to a climatic change, but probably without rainfall reduction, as the lake level of Lake Barombi remained stable (refs. 9 and 10, their figure 10B), a fact that could be responsible for a bias in the isotopic data. Indeed, currently several patches of natural savannah occur at ∼50 km southwest of Lake Barombi on the northeast flank of Mount Cameroon and close to the 2,500-mm isohyet (ref. 9, their figure 2). These savannah areas are related to a rain shadow effect in the northeast sector of Mount Cameroon, explaining a reduction of the rainy season to ∼6 mo (9). Furthermore, the Barombi area, presently covered by rainforest, is also close to the 2,500-mm isohyet but has a rainy season of 9 mo (9). Therefore, the LHRC climatic crisis was probably linked to a rainy season reduction in relation to a general climatic change recorded throughout tropical Africa, as demonstrated in a comprehensive recent synthesis (10).

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