

This is an excellent paper that provides the best evidence to date on an important controversy on the age of the tropical rainforest (TRF) biome, based on fossil leaf floras from the Campanian of Egypt and Sudan, which were near the equator at the time. Since the 1980s, many paleobotanists have argued that typical TRF did not appear until the Paleocene, but since the 1990s molecular phylogenetic dating analyses of extant plants have indicated that many lines now characteristic of the TRF go back to near the beginning of the Late Cretaceous. Probably some readers of earlier brief descriptive papers on these NE African floras thought "this looks like tropical rainforest!" (I know I did), but the present paper is the first to state this conclusion so explicitly and test it with a variety of up-to-date analytical methods. It promises to be a landmark in understanding of the origin of this uniquely diverse and threatened biome.

I see no major substantive issues with the data and reasoning in this paper. Somewhere it should be noted that Egypt and Sudan were near or on the equator in paleogeographic reconstructions for the Campanian, which makes the presence of TRF here more plausible. This is alluded to in the final discussion (p. 13, lines 4-7), but only obliquely. The rationale and results of the rarefaction analysis need some explanation to be more intelligible to non-specialists (see notes on p. 8, line 3; p. 9, line 23; p. 10, lines 2-3).

Most of the following detailed comments and suggestions refer to minor stylistic and technical problems that are easily corrected.

p. 2, lines 3-4: "we test" would be more idiomatic.

- line 7: don't you mean "conclude" rather than "assume"?

- lines 8-9: "based on fossil leaves" might be better placed at the beginning of the sentence or after "conclude."

- line 11: "nearly complete absence" would be more logical and idiomatic.

p. 3, line 5: this implies that the closed canopy is stratified, when the closed canopy is one several layers, including emergents and lower strata.

- line 6: what does "at least in the understory" mean? Woody angiosperms are usually dominant, not just present, in the canopy and the emergent layer (except for conifers in some regions), while the lower strata include both woody angiosperms and non-woody tree ferns and palms.

- line 7: "Molecular phylogenetic studies of modern plants..." might make the situation clearer.

- line 9: "its" instead of "their"?

- line 10: "has not": subject is "TRF."

- line 14: Wolfe and Upchurch (1987. North American nonmarine climates and vegetation during the Late Cretaceous. *Palaeogeogr. Palaeoclimatol. Palaeoecol.* 61: 33-77, p. 48) did interpret the early Cenomanian flora at the Fort Harker locality in the Dakota Fm. as physiognomically TRF.

- lines 15-16: "most previous information"; hyphen and space after "mid."

- lines 17-18: "Nevertheless" isn't idiomatic here: "However, relevant material... was collected" (subject is "material").

- line 20: "were preliminarily..."
- lines 21-22: "However" would be more idiomatic than "Nonetheless"; "focused on only a few..."

p. 4, line 1: "seven other..." Check numbers against p. 6, lines 7-11.

- line 3: no "a" before "fossil" (OK before "habitat").
- line 4: "fossil assemblages" to make sure that "contemporary" isn't taken to mean "Recent."
- line 5: colon rather than period at end?
- line 6: comma after "physiognomy" for consistency with the next points.
- line 7: comma after "C" and "1500 mm," space before ">."
- lines 9, 10: capitalize "A" for consistency.
- line 15: "sometimes" or "often" rather than "partly"?
- line 16: "comprise" present tense, as in line 14.
- line 21: "has also been ascribed" would be more idiomatic.
- line 22: no "the" before "fluvial."
- line 23: "products into a shallow..."? "Whereas" doesn't make sense here; better to delete and change "but" to "although" in the next line.

p. 5, line 5: "despite rare" isn't grammatical; better to say "although rare" after "Quseir Fm."

- line 8: "might have" is superfluous and could be deleted.
- line 11: "which have been" would be more idiomatic.
- line 13: "that wildfires could also be ignited within ever-wet TRF" would be more idiomatic word order.
- line 18: "op. cit." is rarely used in scientific writing, and "2003" would be shorter.
- line 20: "subordinate": this is an adjective modifying "habitats," not an adverb modifying "drier."
- line 21: "plants grew" would be more idiomatic; no comma at end.

p. 6, line 4: "comprise"; comma before "which" clause.

- line 5: "collected" would be more idiomatic than "gathered."
- line 6: comma before "which"; "has been dated"; delete redundant "age."
- lines 7-11: this is confusingly written, such that the numbers don't seem to add up. In line 7, "addition," "additional," and "also" are rather

repetitive: "Eight [if I'm counting right] smaller assemblages were also studied, of which four are from Egypt, including three from..., and one from the Qena area... The other four assemblages are from Sudan..."?

- line 14: do you mean "1987), all of which are from..."?
- line 15: "a lower age boundary is defined by a regional hiatus..."?
- line 17: comma before "which."
- line 18: "age boundary is defined by a transgression that..."
- line 21: "to plant megafossils..."
- line 22: "and" before "crocodiles."

p. 7, line 4: "a literature survey": none has been mentioned so far.

- lines 5-6: "differs from all others... described by Ellis et al. (2009) in their manual of leaf architecture"? The present wording seems to give this publication near-biblical status.

- line 8: "at an obtuse angle to the midvein"?
- line 9: "corded" should presumably be "cordate."
- line 11: "orders" plural.
- line 12-13: semicolon after "proxies"; comma after "parameter."
- line 14: what does "giving" mean here? Delete?
- line 18: reverse citations to keep them in chronological order.
- lines 22-23: "data set, which considers" would be more idiomatic.

p. 8, line 1: delete "Supplementary material;" in parentheses.

- line 3: what does "rarified diversity" mean, and just what role does it play in rarefaction analysis? This may be because I'm not familiar enough with this sort of analysis, but it could also mean that a few more details, or at least a reference, are needed.

- line 6: comma before "which" clause.
- line 11: the "Hunco" locality is better known as "Laguna del Hunco"; check later mentions.
- line 12: what does "as material given" mean?
- line 15: "were produced"?
- lines 20-21: comma belongs after "taxa," not "specimens." Later in this manuscript the taxonomically obsolete term "dicots" is used for "non-monocotyledonous angiosperms"; maybe "(dicots)" could be inserted here for readers not familiar with the change in terminology.
- line 23: "occurring" is redundant when you've said "present."

p. 9, line 6: "with a preserved margin" would be more idiomatic.

- line 8: it might be helpful to indicate ">25°C:" in the reference to Wolfe. "Furthermore" might make more sense than "Whereas."

- line 9: what are Wing et al. being cited for? Their method of estimating leaf area? The present wording implies that they made the 69 cm² estimate.

- line 10: "an estimate": only a single estimate is given. "2609 mm, which is comparable to >1500 mm" would be more idiomatic.

- line 13: "favors" would be more idiomatic than "advocates."

- lines 14-15: replace semicolons with commas, move second parenthesis after "21°C."

- line 15: "reflects" rather than "is reflected by."

- line 17: comma before "while."

- line 23; p. 10, line 2: is "rarified" standard terminology? What does it mean? It's not intuitively obvious to a non-specialist. Looking at Fig. 5, I might guess that the curve for NE Africa would level off at about twice the observed number of species. More explanation is needed.

- line 24: "appears": subject is "diversity."

p. 10, line 1: "and is richer"?

- lines 2-3: which assemblages "rarified" at 20 specimens? The rest of the sentence needs work; do you mean "when the remaining assemblages from NE Africa are included, in order to maximize sampling, they rarify at a similar point"? Or what? See also p. 26, lines 3-4.

- line 7: "African Campanian" would be more idiomatic word order.

- line 8: "angiosperms, which account for" would be smoother.

- line 9: comma after "angiosperms."

- line 12: comma at end of line. Is the name "Guaduas" or "Guadas" (p. 11, line 8)? Check and correct throughout.

- line 14: see note on p. 8, lines 20-21 on "dicots." You could say "of both monocots and other angiosperms."

- line 17: "support a closer affinity of the NE African vegetation with younger TRF than with coeval subtropical vegetation" might make the contrast clearer.

- line 22: "mid-latitude floras." The point concerning Araceae is unclear without more explanation: "Araceae, which are abundant in NE Africa, also occur at Grünbach, but..."

- line 23: delete "the" at end of line.

p. 11, line 1: "Considering its relation to" might go better with the rest of the sentence.

- line 2: for clarification, insert "Guaduas morphotype" before "GD05." If this isn't correct, it just shows that more explanation is needed.

- line 4: "of which the latter have not been observed in NE Africa"?

- line 5: "have possible araceous affinities, but neither of them..."

- line 6: what does "introduced the exclusive occurrence" mean? It seems to say the flora consists only of palms.

- line 9: "to that at Baris"? "not only Zingiberales" (to anticipate "but also"); "especially morphotype CJ49"

- lines 10-11: this list is confusing; am I right in assuming that *Montrichardia* is the Correjon colocasioid? If it is, move "*Montrichardia* (CJ3)" up after "but also" and before "a colocasioid member of Araceae" (Araceae is plural, so "a... Araceae" is ungrammatical).

- lines 10, 11, 12: comma, not period, after "Mohr."

- line 11: "and a member of Araceae..."

- line 13: "terrestrial Araceae at Baris"; "*Afrocasia* is a member of Aroideae..."

- lines 14-15: "that are usually found... but also occur in warm..."

- line 16: "both genera that belong to groups restricted to..."

- line 17-18: this sentence doesn't make sense as written. Do you mean *Lejalía* has compound leaves resembling those of Aroideae that grow in seasonal tropical vegetation, or are you talking about something else?

- line 18: "dicot morphotypes..."

- line 23: are these salicoid teeth of Hickey & Wolfe (1975)? No need to mention, but does support identification with Salicaceae.

p. 12, lines 6, 11; p. 13, line 14: "NE African Campanian" would be a more idiomatic order of adjectives.

- line 7: "comparable to that of modern" would be more grammatical; capitalize "Late."

- line 8: "increased precipitation" by itself seems nearly tautological; "models predicting increased"? "global proxy evidence for"? or what?

- line 9: "overlap" is unclear: can you find a more precise word?

- line 11, p. 13, line 15: "aroids" is often used as a common name for Araceae, but it has the disadvantage of seeming to refer to the subfamily Aroideae. Depending on what you mean, "Araceae" or "Aroideae" would be preferable.

- line 12: "that the Late..."

- line 14: "an apparent conflict": this explanation doesn't address all such conflicts.
 - line 15: "almost complete absence" would be more idiomatic.
 - line 18: this might be a good place to mention where Guaduas is.
 - line 19: I'd like to see more evidence before accepting that the Crato flora may be Barremian; its palynological correlatives in Gabon/Congo are increasingly well dated as Aptian (Eldrett, J.S., Bergman, S.C., Heine, C., Edwards, P., Jakeman, M., Miles, N., Hambach, B., Bohaty, S., Wilding, M.R., 2022. Integrated bio- and chemo-stratigraphy for Early Cretaceous strata offshore Gabon: Additional constraints on the timing of salt deposition and rifting of the South Atlantic. *Marine Petrol. Geol.* 148: 106037).
 - line 21: "angiosperm" or "angiospermous" component; "that of younger..."
 - line 22: "magnoliids" lower case, as for anglicized taxon names in general.
 - line 23: "of tropical vegetation..."
- p. 13, line 2: "floras" plural; "although new..." would be more idiomatic than "despite that."
- lines 4-5: "climate, and it has rather low diversity..."
 - line 7: "extending" rather than "expanding," which means increasing in area or volume.
 - line 8: comma before "which" clause.
 - line 12: "collections obtained from..."
 - line 13: "imply" or "indicate" rather than "infer," which means to draw conclusions from; "comparable to that of modern..."

References: I have not gone over these in detail, but I note a lot of inconsistencies in abbreviation of journal titles (compare Abu-Kheir 2020 and Barazi 1985), capitalization of words in article titles (e.g., Mohr & Friis 2000; only first words and proper nouns should be capitalized), inclusion of issue numbers (e.g., Belcher et al. 2010, Coiffard & Mohr 2016; normally not indicated unless each issue is paginated separately), and omission of diacritical marks (Lejal-Nicol 1987). In page 17, line 21, there is confusion in listing of authors' initials.

p. 20, line 1: with "All," these two sentences contradict each other.

- line 15: add "cited in the text" after "researchers"?

p. 21, line 2: "Locations of the fossil assemblages studied"?

- line 3: "was created"?

p. 22, line 1: maybe add "(non-monocotyledonous angiosperm)" after "dicot" in this first leaf figure.

p. 24, line 1: "monocot, conifer..., and fern..." (singular) when used as modifiers of "morphotypes."

p. 25, line 1: semicolon or period after "curves."

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