

Africa as an evolutionary arena for large fruits

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1. BACKGROUND

- Pattern:** Fruit sizes differ globally, but Africa stands out with the largest fruits (Fig. 1, top).
- Paleoclimate:** Strong paleoclimatic change, interplay between expansion and contraction of rainforest and savanna in Africa
- Seed dispersal:** Most plants in the tropics are animal-dispersed (e.g., frugivory – i.e., swallowing and excretion of fruits or seeds by animals as a dispersal strategy).
- Megafaunal extinction:** Africa is globally special in its continued presence of megafauna (animals > 50 kg) that can disperse large seeds coming from large fruits (Fig. 1, bottom, right).

2. QUESTION

Have these circumstances in Africa led to increased fruit sizes?

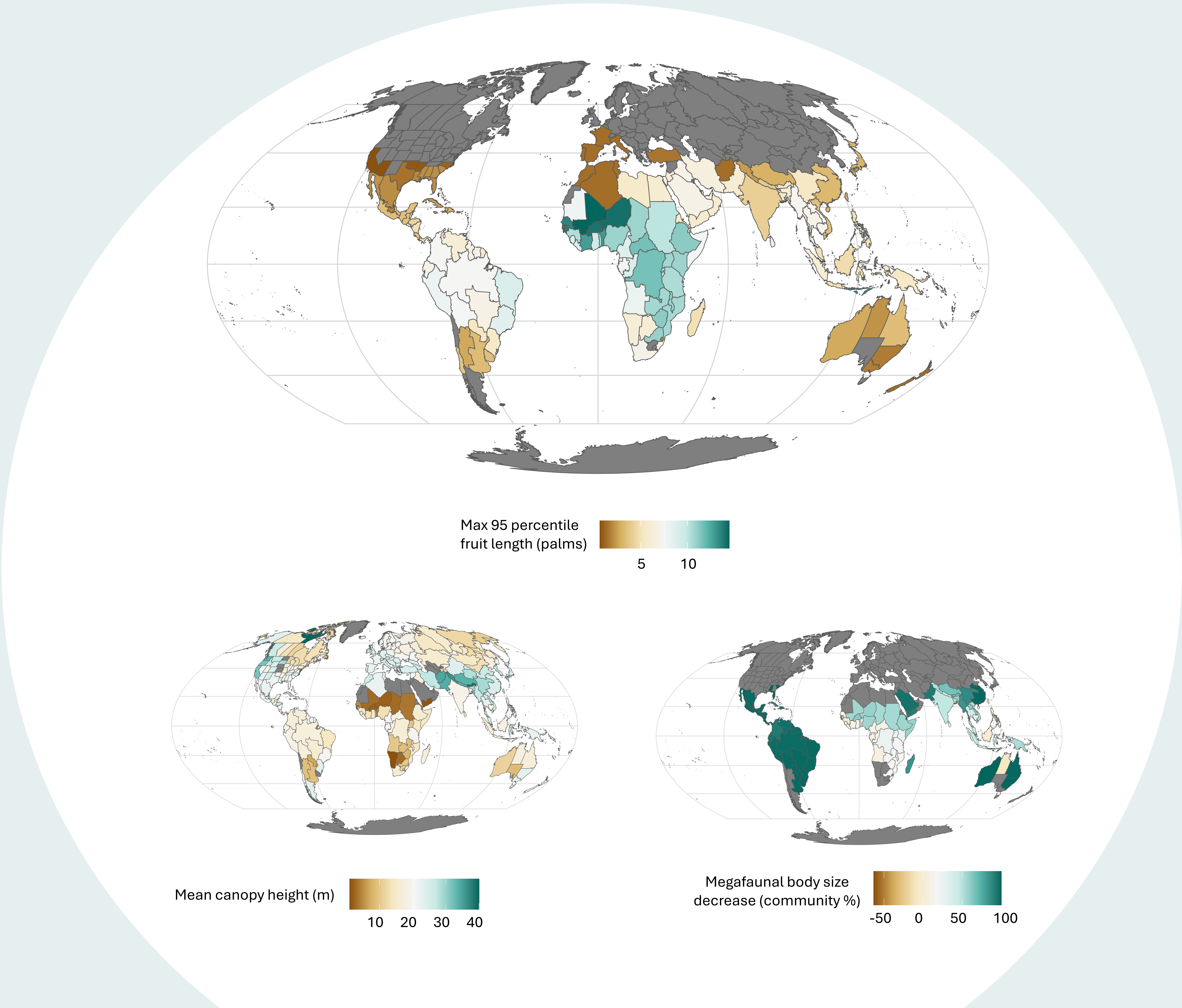


Figure 1: Botanical countries

3. METHODS

- Phylogenetic comparative methods
- Comparisons of models for neutral vs. adaptive evolutionary processes under different evolutionary selective regimes (megafaunal community stability, open/closed forest specialization)
- Simulation of ‘phylogenetically neutral’ fruit sizes along the branches of the phylogeny
- Ancestral state reconstruction of selective regimes
- Spatial autoregressive models for association testing of fruit sizes and associated factors (Fig. 2)

4. RESULTS

- Strong association between low canopy height, seasonal climate, and large fruits in Africa – but not elsewhere (Fig. 2).
- Association between the current median body size and large fruits
- Different selective regimes for fruit size in Africa than elsewhere
- The interaction between drying climate, the establishment of African savannas, and the stable availability of frugivorous megafauna for seed dispersal through time may explain why fruit sizes have evolved and maintained to be larger in Africa than elsewhere

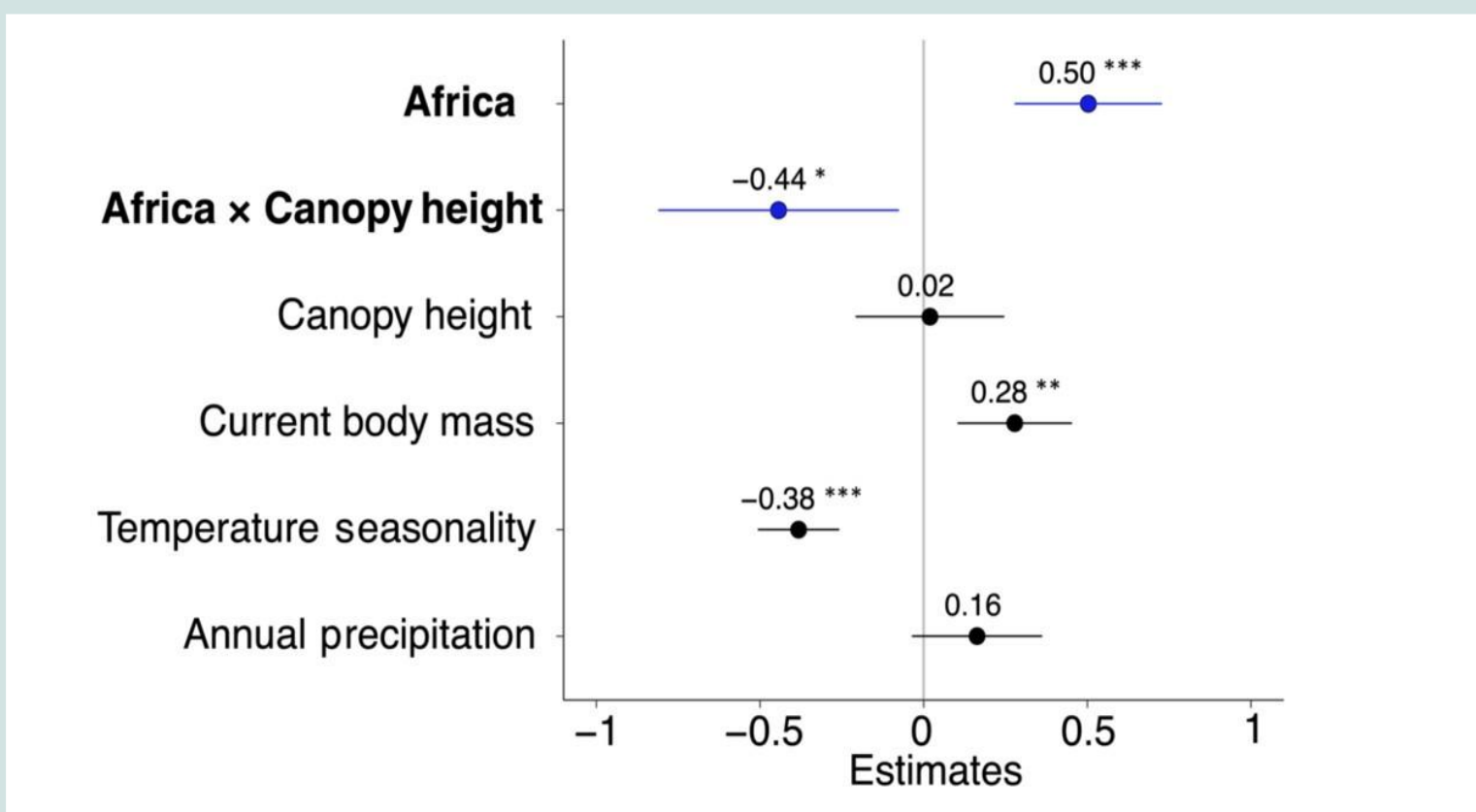


Figure 2: Association of large palm fruits

5. CONCLUSION

Environmental filtering by the loss/lack of megafauna to disperse large fruits contributes substantially to the distribution patterns of large-fruited plants.

6. REFERENCES & ACKNOWLEDGEMENTS

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