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Short Title: XXX

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Data Archiving: Data are available on DRYAD (doi:10.5061/dryad.xwdbrv1f6 (Tejero-Cicuéndez et al. 2021b)). R-scripts are found in the Supplemental Information.

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Abstract

asdf

Introduction

some general paragraph on the evolution of phenotypic diversity

when organisms colonize new and unique habitats, they are subjected to novel ecological selection pressures in those habitats. Often these selective pressures elicit changes in body form, as organisms adapt to their new habitats (examples: some comment on ecomorphs, etc.). . . . . leads to so-called ecomorphs, with such well known examples in Anolis lizards, cichlid fishes, etc. It follows that . . . Some comment on the fact that clades living in diverse ecological conditions often display greater diversity in form and function (REFS).

However, while the above patterns have been well documented in a variety of vertebrate taxa, what remains less known is how allometry plays a role in this phenotypic diversification. We know that XYZPDQ (about allometry). Then links to diversity..

The Afro-Arabian geckos in the genus *Pristurus* afford the opportunity to elucidate the interdigitating effects of allometry and habitat specialization on clade-level patterns of phenotypic diversity. Prior work on this system (Tejero-Cicuéndez et al. 2021a) has revealed that . . . (sentence or 2 about your prior study, getting to diversity and . . . Importantly, . . . something about habitat. . . . . What remains unexamined however, is XYZPDQ. . .

In this study, we . . .

Materials and Methods

Data

For this study, we used recently published phylogenetic, phenotypic, and ecological data of the species of the genus *Pristurus* including undescribed diversity (Tejero-Cicuéndez et al. 2021a). Briefly, these data consisted of: i) a phylogenetic tree of the relationships among all the *Pristurus* species with available genetic material; ii) an individual-level phenotypic dataset of linear measurements including body size (snout-vent length, SVL) and several variables describing body shape: trunk length (TrL), head length (HL), head width (HW), head height (HH), humerus length (Lhu), ulna length (Lun), femur length (Lfe), and tibia length (Ltb); and iii) ecological data as a discrete character with three states (ground, rock, and tree) reflecting the ground-dwelling, rock-climbing, or arboreal habits of each species. For all the analyses, we used only those species present in the phylogeny for which the available phenotypic data consisted of five or more specimens. This resulted in a curated morphological dataset of 687 individuals from 25 species, with a mean of 27 specimens per species, a minimum of nine and a maximum of 56. For more detailed information about these data and data collection, especially regarding morphological measurements, refer to the original source (Tejero-Cicuéndez et al. 2021a).

Statistical Analyses

To test the hypothesis…

- Mancova body ~ SVL*hab.gp
    - PW of slopes, and inspected reg. coefficients to identify biological trends
    - Visualized multivariate regressions via regression scores (sensu Drake and Klingenberg 2008) and predicted lines (sensu Adams and Nistri 2010)
- Examine allometry phylogenetically.
    - PLS of head vs. SVL and limb vs SVL. Obtained scores on 1st axis for each.
    - within-species regressions of Head.sc ~ SVL & limb.sc ~ SVL; obtained regression coefficients (slopes)
    - mapped slopes on phylogeny under BM and generated traitgrams to identify changes in allometric relationships across the phylogeny
- Finally, to link allometric patterns with trends in phenotypic diversification we obtained size-standardized species means, following procedures in H TC paper (residuals from phylo-regressions of traits on SVL, residuals). We then performed an ordination to obtain a phylomorphospace, where habitat types and species could be observed.

Results

Discussion

References

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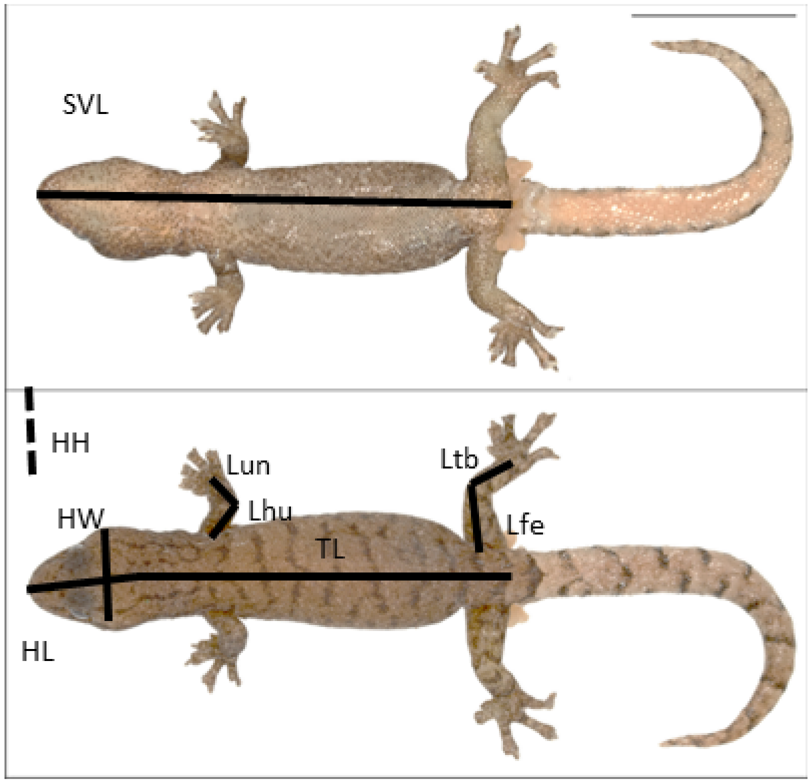
Figures

Figure 1. Linear Measurements used in this study. SVL = snout-vent length, TL = trunk length, HL = head length, HW = head width, HH = head height, Lhu = humerus length, Lun = ulna length, Lfe = femur length, Ltb = tibia length (for details see Tejero-Cicuéndez et al. 2021a).

Figure 2. Plot of regression scores and predicted lines representing the relationship between linear body measurements and size (SVL). Individuals re colored by habitat use: rock (beige), ground (dark purple), and tree (magenta).

Figure 3. Traitgrams showing the evolution of body size (SVL) through time based on the phylogenetic tree of *Pristurus*. Colors represent an evolutionary mapping of regression slopes describing the relationship of (A) head morphology versus body size, and (B) limb proportions versus body size (see text for descriptions). Species names are colored by habitat use: rock (beige), ground (dark purple), and tree (magenta).

Figure 4. Phylomorphospace of *Pristurus*, based on residuals from a phylogenetic regression of body measurements on size (SVL). Species means are colored by habitat use: rock (beige), ground (dark purple), and tree (magenta). Large and small rock-dwelling and ground-dwelling are highlighted with darker colors to highlight their differentiation and relative positions in morphospace.



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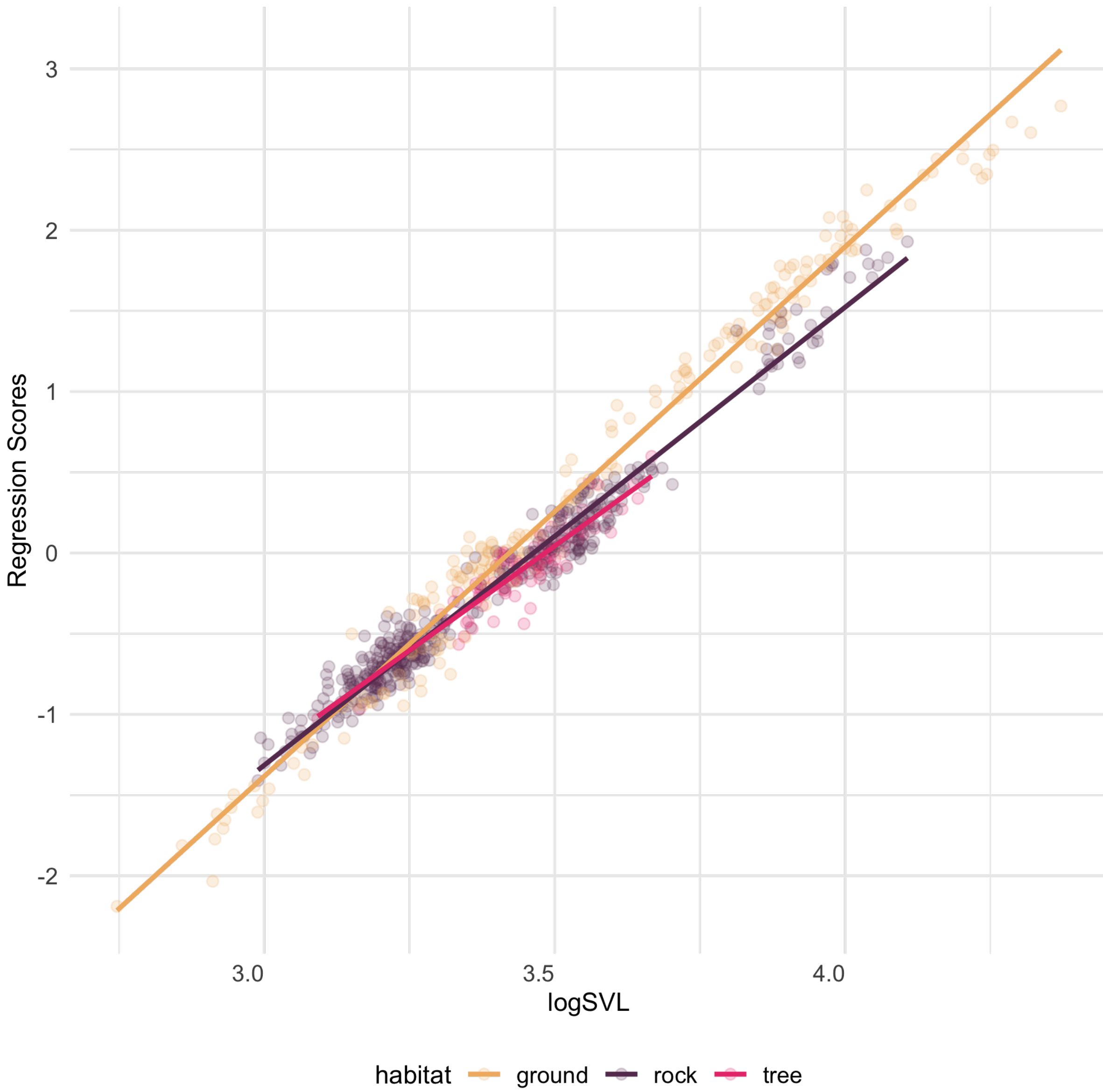

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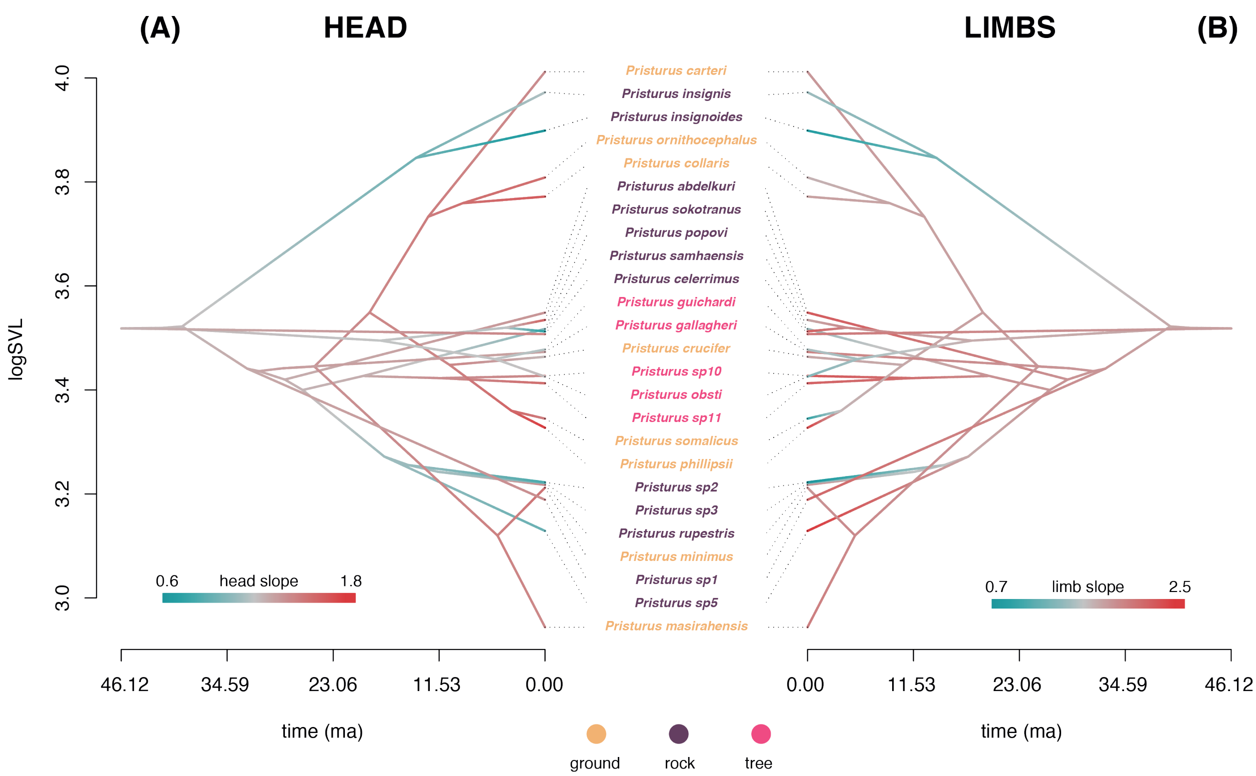

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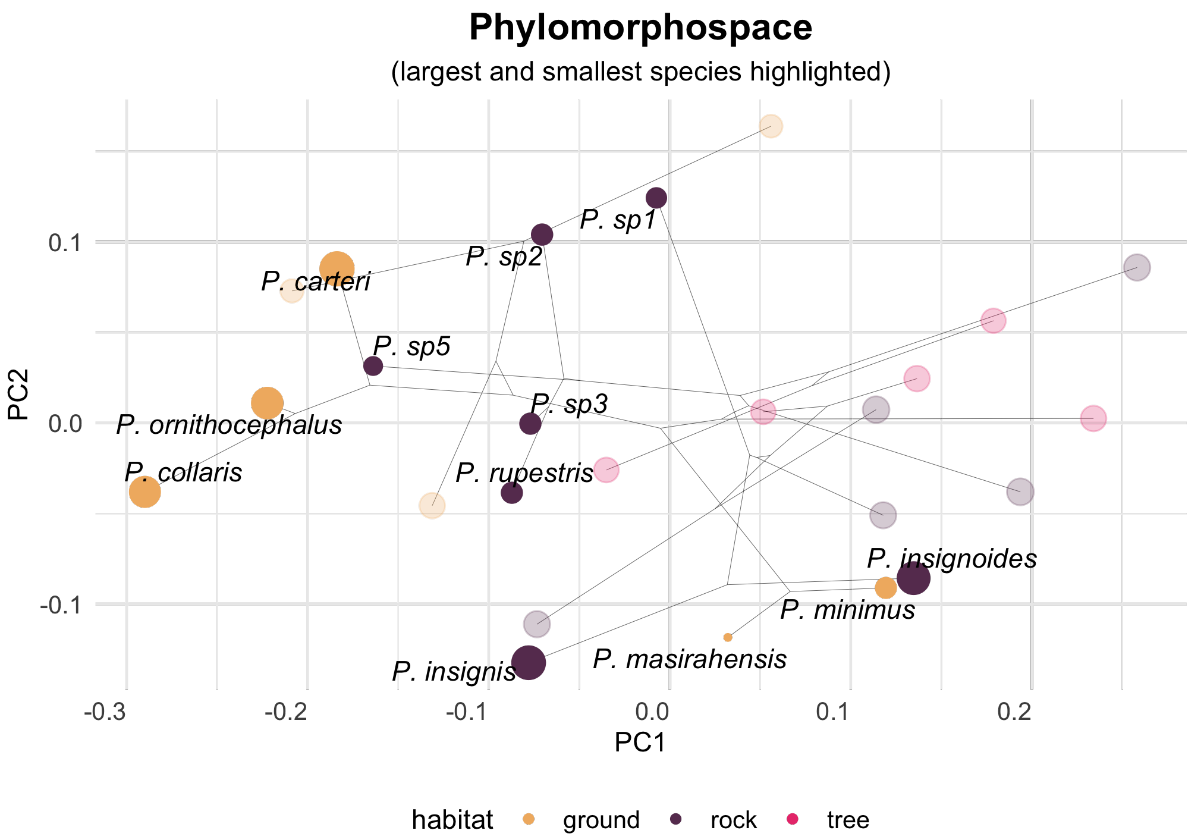

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