Amphibia-Reptilia

Conspecifics of the Striped Lava Lizard are able to distinguish sex and male colour morphs in apparently homogeneous dull dorsal colouration

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Abstract. Animal colouration plays a key role in inter and intraspecific interactions, pre-eminently in mate signalling. When multiple types of colouration occur within sexes it is possible that they show alternative reproductive strategies. In lizards, most colouration studies do not incorporate how colour is perceived by conspecifics. Here, we used unbiased colour analysis methods (spectrophotometry and visual modelling) to test for sexual dimorphism and within male dichromatism in the Striped Lava Lizard. We found that males express two distinct colourations that are different from females in several dorsal and ventral body regions. Our results showed UV reflection at the throat, an important body region for signalling. Ventral patches, the coloured badge seen in adult males of *Tropidurus* spp, have two distinct colour classes within males (Y and B males). Morphs are best discriminated by blue and yellow chroma, and brightness. Body size had little influence on colouration, suggesting that colour may be linked to inheritance rather than growth. Our study clearly shows sexual dichromatism and the existence of colour morphs in this species. Moreover, morph differences in colouration are perceptible by conspecifics. These differences are not only between ventral patches, but also in other body parts such as the dorsum, previously considered as cryptic by human observers. We suggest that colouration at the ventral patches and throat might play a role in intraspecific interactions. Patches increase colour intensity during breeding season and are likely to be costly by pigment-based expression, whereas throat's UV reflection might have a cost infringed by conspicuousness.

Keywords: alternative reproductive tactics, animal colouration, dichromatism, male morphs, *Tropidurus semitaeniatus*, visual modelling.

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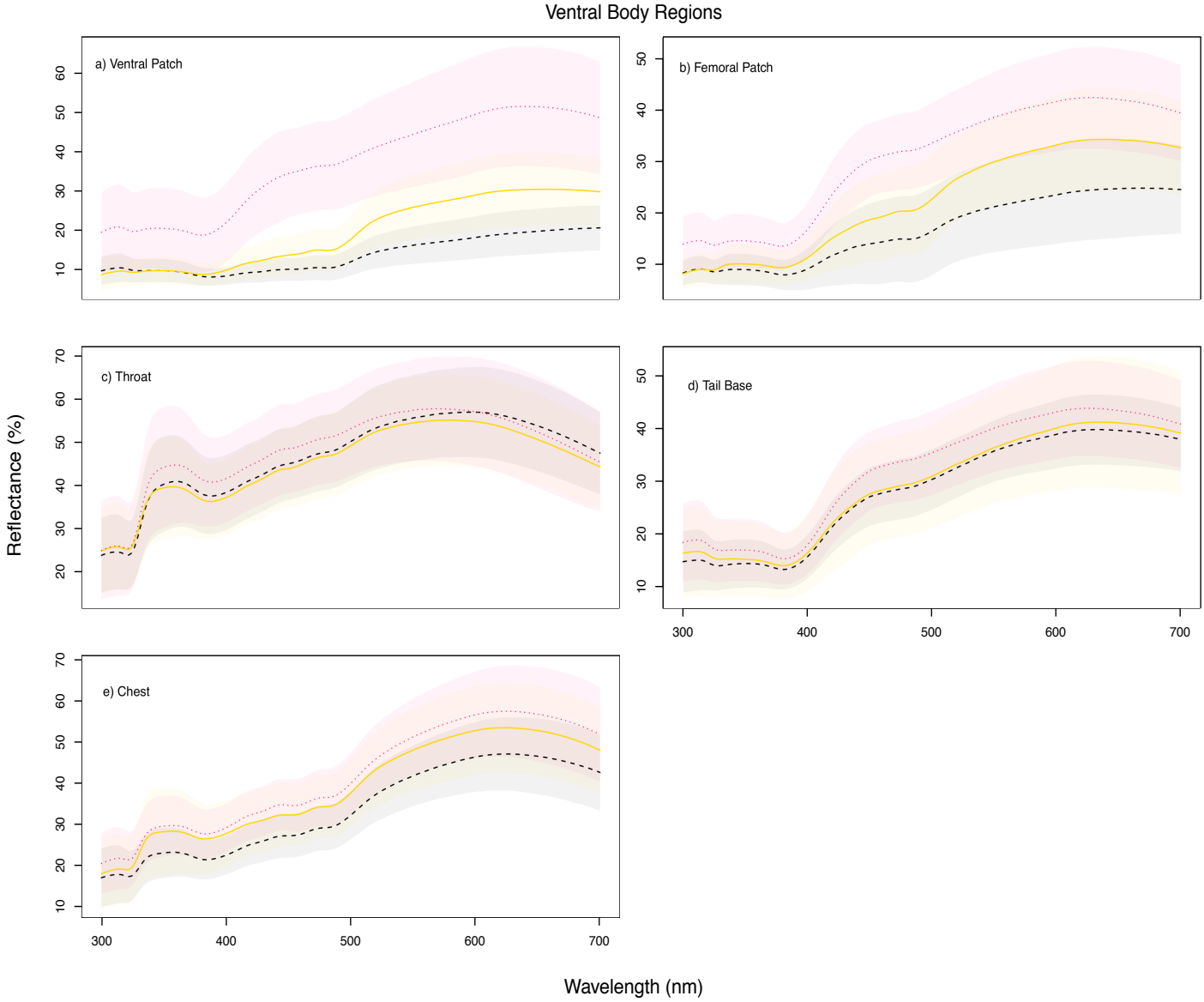
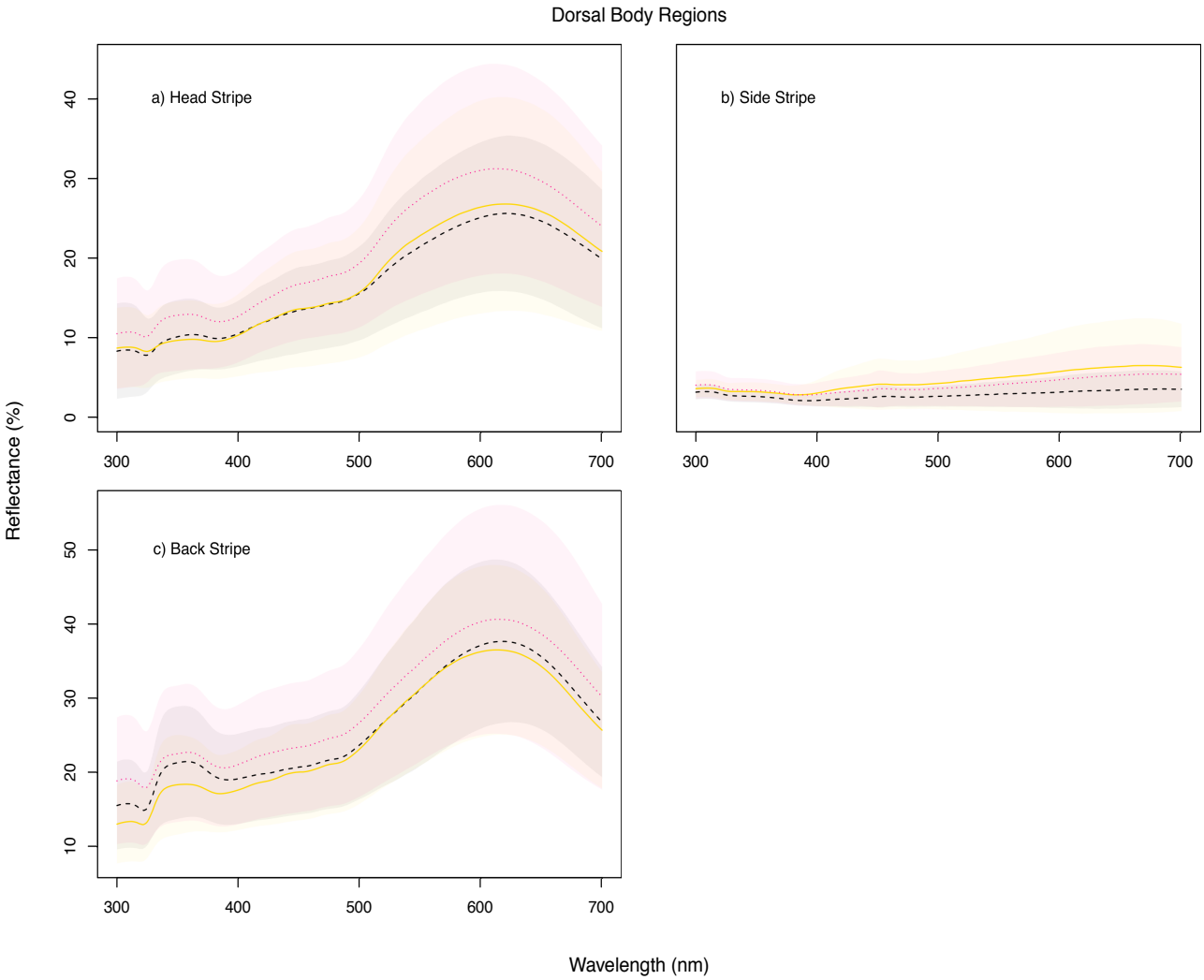
Supplementary material

Table S1. Descriptions of color variables. Adapted from Maia et al. (2013).

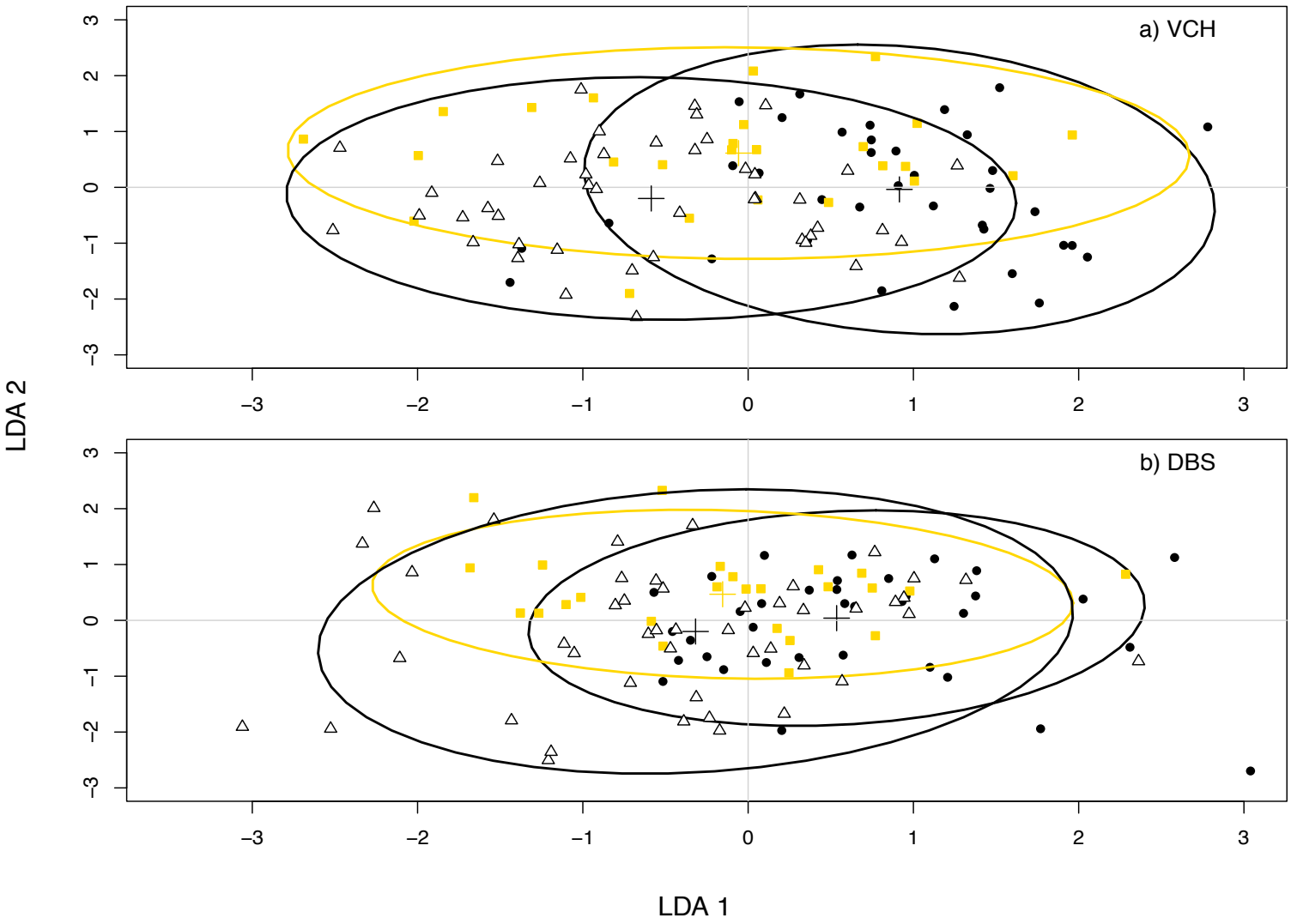
Colour Variable		Description
Hue = λRmax		Hue: wavelength of peak reflectance.
$S = \sum_{\lambda a}^{\lambda b} R\lambda / B1$		Chroma: segment-specific chroma calculated by dividing the sum of reflectance values over region of interest (e.g. from λa to λb) by the total reflectance.
	S.UV	Chroma calculated for the segment-specific range of lambda min–400nm
	S.Violet	Chroma calculated for the segment-specific range of lambda min–415nm
	S.Blue	Chroma calculated for the segment-specific range of 400nm–510nm
	S.Green	Chroma calculated for the segment-specific range of 510nm–605nm
	S.Yellow	Chroma calculated for the segment-specific range of 550nm–625nm
	S.Red	Chroma calculated for the segment-specific range of 605nm–lambda max
Bri = B1/nwl		Mean brightness: average reflectance over all wavelengths.



S1 Figure. Reflectance curves of ventral body regions. Plots of reflectance curves of all ventral body regions. Females (red dotted lines), Y males (yellow solid lines) and B males (grey dashed lines) are plotted separately. Spectra curves show different body regions: Ventral Patch - V_{Patch} (a); Femoral Patch – $V_{FemoralPatch}$ (b); Throat – V_{Throat} (c); Tail Base – $V_{TailBase}$ (d); and Chest – V_{Chest} (e).



S2 Figure. Reflectance curves of dorsal body regions. Plots of reflectance curves of all dorsal body regions. Females (red dotted lines), Y males (yellow solid lines) and B males (grey dashed lines) are plotted separately. Spectra curves show different body regions: Head Stripe – $D_{HeadStripe}$ (a); Side Stripe – $D_{SideStripe}$ (b); and Dorsum Stripe – D_{Stripe} (c).



S3 Figure. Plots of linear discriminants by body regions. Linear discriminant plots of the remaining body regions with significant difference among morphs: Chest – V_{Chest} (a); and Dorsum Stripe – D_{Stripe} (b). Females (grey triangles), Y males (yellow squares) and B males (black circles) distributions are plotted separately. Continuous lines delimit 95% of confidence interval. Centroids are marked by cross signs. LD1 and LD2 axis show the functions that better discriminate sex and male colour morph, respectively.