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Information out of the blue: phenotypic correlates of abdominal color patches in *Sceloporus* lizards

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Highlights

- Colorful belly patches of *Sceloporus* lizards convey information about male quality.
- Different color components of these patches transmit distinct messages.
- Patch area and brightness of the blue component are indicative of male body size.
- Blue saturation and achromatic conspicuousness are signals of immunocompetence.
- These associations differed among species, indicating species-specific signals.

critical information about the quality of the signaler. In this study, we focused on different color characteristics of the abdominal patches of males of six lizard species from the genus *Sceloporus*. We addressed three main objectives. First, we examined if size, brightness, saturation, and conspicuousness of these ornaments are indicative of body size, condition, immune function, or levels of testosterone and corticosterone. Second, we evaluated if the distinct components of these abdominal patches (blue or green patches and black stripes) transmit similar information about the signaler, which would support the redundant signal hypothesis, or if these components are related to different phenotypic traits, which would support the multiple message hypothesis. Third, we compared the phenotypic correlates of these ornaments among our six species to understand the degree of conservatism in the signaling patterns or to find species-specific signals. Using data collected from males in natural conditions and a multi-model inference framework, we found that in most species the area of the patches and the brightness of the blue component are positively related to body size. Thus, these color characteristics are presumably indicative of the physical strength and competitive ability of males and these shared signals were likely inherited from a common ancestor. In half of the species, males in good body condition also exhibit relatively larger blue and black areas, suggesting that the expression of these ornaments is condition-dependent. Abdominal patches also provide information about immunocompetence of the males as indicated by different correlations between certain color characteristics and ectoparasite load, counts of heterophils, and the heterophil:lymphocyte ratio. Our findings reveal that area and brightness of the abdominal patches signal the size and body condition of males, whereas blue saturation and conspicuousness with respect to the surrounding substrate are indicative of immune condition, thus supporting the multiple message hypothesis. However, some of these correlations were not shared by all species and, hence, point to intriguing species-specific signals.

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Keywords

Colorful ornaments; immune function; Phrynosomatidae; steroid hormones; visual communication



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