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Digest

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Digest: Unveiling the role of chemical communication in lizard diversification

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This article corresponds to Murali, G., Meiri, S., & Roll, U. (2023). Chemical signaling glands are unlinked to species diversification in lizards. *Evolution*, 77(8), 1829–1841. https://doi.org/10.1093/evolut/qpad101.

Abstract

Although many studies looking at the role that sexual selection plays in macroevolution have focused on the involvement of visual and acoustic signals, the potential influence of chemical communication remains unexplored. Instead of focusing on well-studied instances of sexually selected traits, Murali et al. analyze chemical communication to test whether sexual selection could help explain large-scale species diversity patterns in lizards. Their results suggest that, at least in lizards, chemical communication is uncoupled from differential diversification dynamics across clades.

The concept of sexual selection has long captured the interest of naturalists and biologists, as it is thought to play a fundamental role in driving patterns of speciation among sexually reproducing organisms (Panhuis et al., 2001). In this form of natural selection, individuals are selected as mates based on specific traits, which can be conveyed through visual, acoustic, and chemical signals. The study of sexual selection has traditionally focused on visual and acoustic cues (Symonds & Elgar, 2008), often overlooking the potential significance of chemical signals (Baeckens, 2019). Although there is now extensive information on chemical communication across the tree of life (Baeckens, 2019; Schulz, 2005), it remains uncertain whether the mechanisms underlying the evolution of intra- and intersexual chemical signals could further explain extant patterns of diversity across clades.

In a recent study, Murali et al. (2023) explore the potential of traits associated with chemical communication to promote species diversification in lizards. The authors investigate the impact of follicular epidermal glands, structures that serve as the primary source of chemical signals in lizards, on the overarching patterns of evolution within the group. Using a phylogenetic comparative dataset that encompasses approximately 49% of extant lizard diversity (3,535 of 7,261 species) and state-of-the-art methods such as HiSSE, FiSSE, and BAMM, Murali et al. (2023) test whether the presence or absence of follicular glands is associated with diversification patterns. The authors detect no differences in diversification rates between lizards with follicular glands and those without. These findings indicate that, at least within lizards, follicular gland-mediated chemical communication plays a very limited role (if any) in explaining large-scale diversification patterns among lineages.

Exploring novel perspectives on extensively studied topics can offer intriguing insights into the prevalence and limitations of specific mechanisms as drivers of diversity patterns across the Tree of Life. Murali et al. (2023) discuss and dissect various explanations for their results, showcasing the multitude of potential mechanisms at play. It is worth noting that while the article's emphasis on trait-specific supra-specific analysis is inherently captivating, Murali et al. (2023) astutely underscore the bias towards visual and acoustic traits in macroevolutionary research of sexual selection in animals (see also Baeckens, 2019).

The complexity of chemical communication in lizards may not reach the same level as that observed in other groups, including insects, arachnids, and even mammals (Symonds & Elgar, 2008; El-Sayed, 2023). Thus, although Murali et al. (2023) do not recover a link between large-scale lizard diversity and chemical communication, their study presents thought-provoking results that are likely to stimulate discussions regarding the generalizability of this decoupling (i.e., sexual selection, chemical communication) across the animal phylogeny. The perspectives presented in Murali et al. (2023) should also prompt further deliberations on the macroevolutionary toolbox, emphasizing the integration of multitrait (e.g., chemical, acoustic, visual) perspectives on diversification models, more systematic testing of the relative importance of traits across taxonomic and temporal timescales, as well as a more thorough examination of the biological meaning of equal statistical fit between null and alternative models.

Conflict of interest

The author declares no conflict of interest.

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