IOCB 2025 Conference

The 2nd International Online Conference on Biomimetics

16–18 September 2025 | Online

MDPI

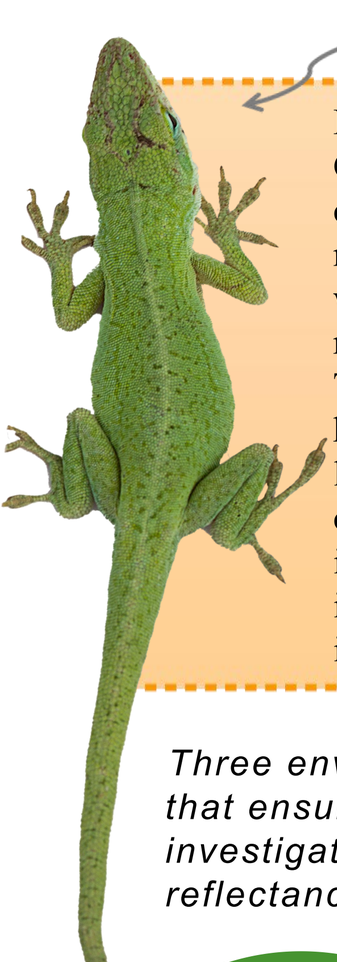
Characteristics of Iridophore Crystals in *Anolis carolinensis*

Jiahui Hu[1] , Xu Chen[1,*] , Aiping Liang[1,2,*]

1 Tianjin Key Laboratory of Conservation and Utilization of Animal Diversity, College of Life Sciences, Tianjin Normal University, Tianjin, China

2 Institute of Zoology, Chinese Academy of Sciences, Beijing, China *** Corresponding author.**

INTRODUCTION & AIM



Anolis carolinensis

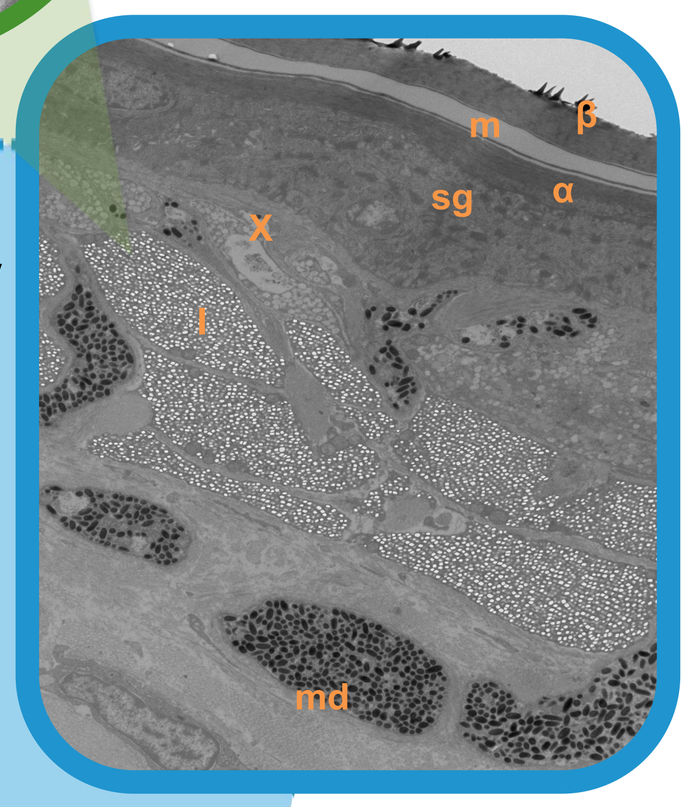
INTRODUCTION

Chameleons or lizards are biomimetic organisms commonly used for color-changing or thermostatic materials. However, the structure of purine crystals within iris cells and their specific role in body color regulation are still poorly understood.

This study aims to address the aforementioned knowledge gap by selecting *Anolis carolinensis* (a lizard species with the ability of rapid body color change) as the experimental subject, with a focus on investigating the structure of purine crystals in its iridophore cells and clarifying their specific function in body color regulation.

Three environmental temperatures(20℃,30℃,40℃), all within the range that ensures the normal physiological activity of lizards, were selected to investigate the relationship between environmental temperature and skin reflectance(300-700nm).→

500nm



Transmission electron microscopy

α: α-keratin layer

β: β-keratin layer

m: intermediate differentiation layer

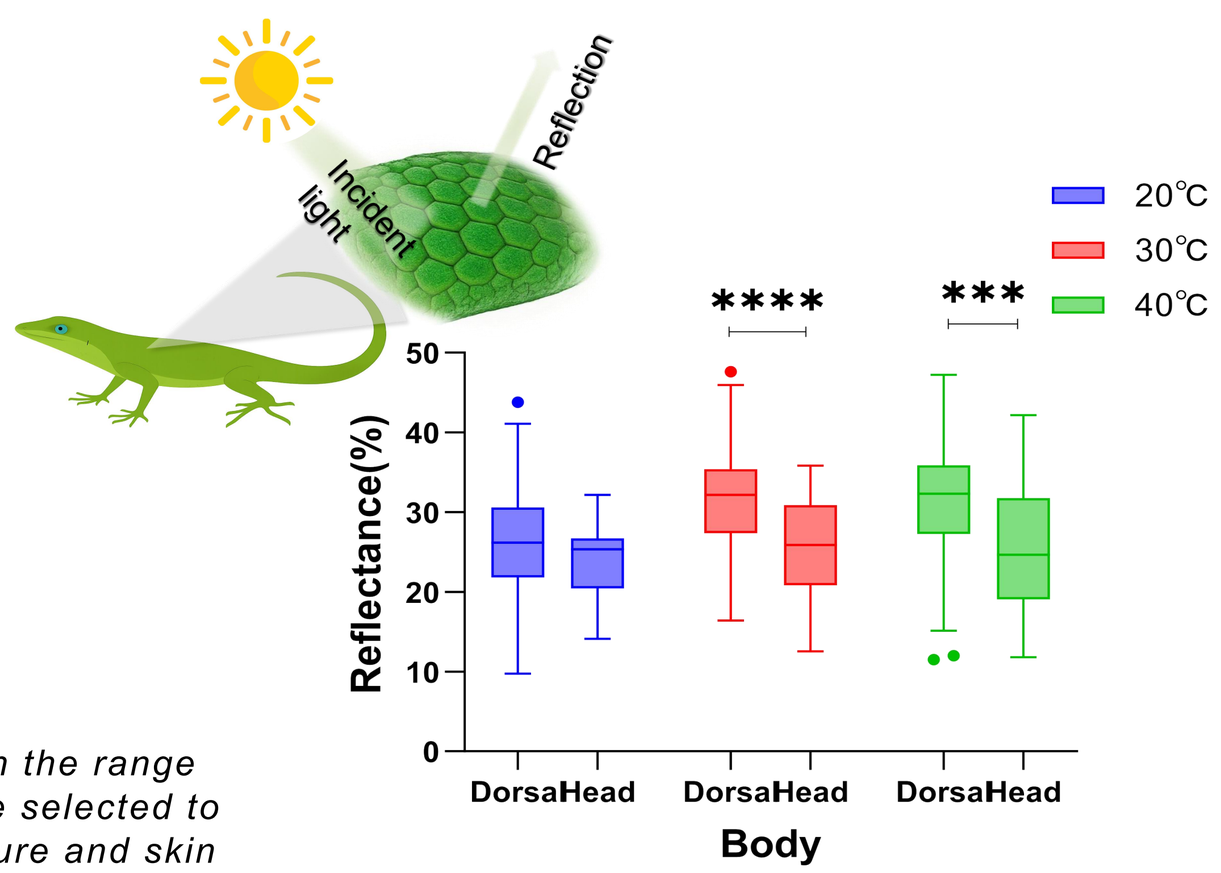
sg: stratum germinativum

x: xanthophore

i: iridophore

md: melanophores

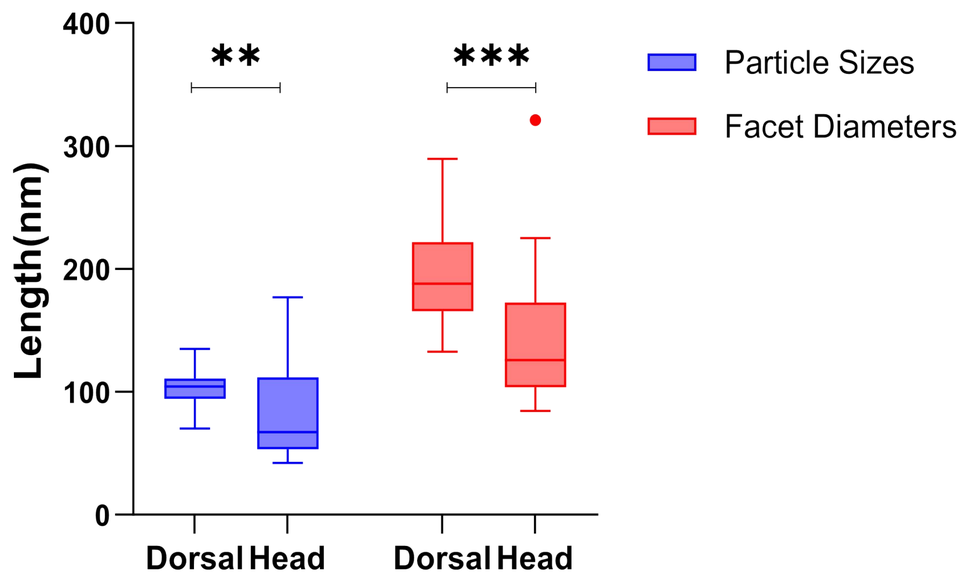
RESULTS & DISCUSSION



Skin reflectance of different body parts at different ambient temperatures

At different ambient temperatures, the peak wavelength of reflection increases with the increase of temperature, and there is a significant difference between the head and dorsal. The dorsal thoracic peak increased from 26.02 ± 0.58 % at 20 °C to 31.40 ± 0.66 % at 40 °C. The peak of the head increased from 23.97 ± 0.82 % to 25.52 ± 1.41 %.

Analysis of the differences in crystal size at different parts



Further examination of crystals extracted from iris cells using SEM revealed lumpy or short columnar structures that were often stacked on top of each other, with facet diameters of 172.46 ± 29.67 nm and particle sizes of 95.30 ± 13.13 nm. Significant differences in crystal size were observed between the head and dorsum, with the dorsolateral lens being thicker and the facet diameter larger than the crystals of the head.

Acknowledgements

We would like to thank Jingjing Liang (Avantes China, Beijing) for her assistance in light reflectance measurement. The work was supported by the National Natural Science Foundation of China (grant nos. 32070470, 32470469).

REFERENCES

[1] Smith K R, Cadena V, Endler J A, et al. Colour change on different body regions provides thermal and signalling advantages in bearded dragon lizards[J]. Proceedings of the Royal Society B: Biological Sciences, 2016, 283(1832): 20160626. https://doi.org/10.1098/rspb.2016.0626.

[2] Pinsk N, Wagner A, Cohen L, et al. Biogenic guanine crystals are solid solutions of guanine and other purine metabolites[J]. Journal of the American Chemical Society, 2022, 144(11): 5180-5189. https://doi.org/10.1021/jacs.2c00724