

## Accepted Manuscript

Genomic regression of claw keratin, taste receptor and light-associated genes provides insights into biology and evolutionary origins of snakes

Christopher A. Emerling

PII: S1055-7903(17)30013-1

DOI: <http://dx.doi.org/10.1016/j.ympev.2017.07.014>

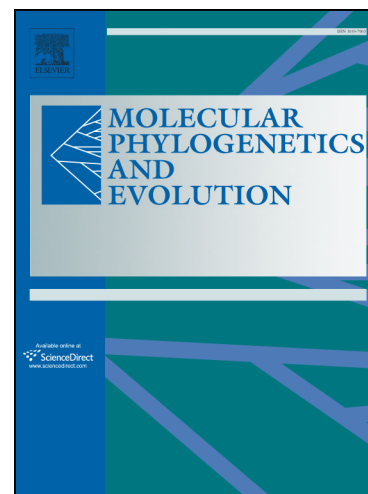
Reference: YMPEV 5877

To appear in: *Molecular Phylogenetics and Evolution*

Received Date: 6 January 2017

Revised Date: 16 June 2017

Accepted Date: 13 July 2017



Please cite this article as: Emerling, C.A., Genomic regression of claw keratin, taste receptor and light-associated genes provides insights into biology and evolutionary origins of snakes, *Molecular Phylogenetics and Evolution* (2017), doi: <http://dx.doi.org/10.1016/j.ympev.2017.07.014>

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**Genomic regression of claw keratin, taste receptor and light-associated genes provides insights into biology and evolutionary origins of snakes**

Christopher A. Emerling

Museum of Vertebrate Zoology, University of California Berkeley, Berkeley, CA, USA

E-mail for correspondence: caemerling@berkeley.edu

Keywords: Serpentes, opsins, color vision, taste receptors, keratins, regressive evolution

**Abstract**

Regressive evolution of anatomical traits often corresponds with the regression of genomic loci underlying such characters. As such, studying patterns of gene loss can be instrumental in addressing questions of gene function, resolving conflicting results from anatomical studies, and understanding the evolutionary history of clades. The evolutionary origins of snakes involved the regression of a number of anatomical traits, including limbs, taste buds and the visual system, and by analyzing serpent genomes, I was able to test three hypotheses associated with the regression of these features. The first concerns two keratins that are putatively specific to claws. Both genes that encode these keratins are pseudogenized/deleted in snake genomes, providing additional evidence of claw-specificity. The second hypothesis is that snakes lack taste buds, an issue complicated by conflicting results in the literature. I found evidence that different snakes have lost one or more taste receptors, but all snakes examined retained at least one gustatory channel. The final hypothesis addressed is that the earliest snakes were adapted to a dim light niche. I found evidence of deleted and pseudogenized genes with light-associated functions in snakes, demonstrating a pattern of gene loss similar to other dim light-adapted clades. Molecular dating estimates suggest that dim light adaptation preceded the loss of limbs, providing some bearing on interpretations of the ecological origins of snakes.

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