Mechanism and ecological function of fungal bioluminescence

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Abstract

After more than 2,300 years of the first observation made by Aristotle on fungal bioluminescence, the first mechanistic proposal appeared in the 1960's in the scientific literature. Again, 50 years passed by to confirm the involvement of enzymes in fungal bioluminescence, whose mechanism is shared by all fungi. More recently, it was reported the structure of fungal luciferin (3-hydroxyhispidin) and the mechanism involved in the light emission process, whose oxyluciferin is recycled by a hydrolase to caffeic acid. Additionally, the ecological niche surrounding bioluminescent mushrooms was investigated through two main means, by the use of glue traps with acrylic phony mushroom that were internally illuminated with green LED lights and by the direct observation of bioluminescent mushrooms with infrared time lapse photography. Ecological studies were performed in the Atlantic rainforest (Mata Atlântica) and in the transitional Coconut Palm forest (Mata dos Cocais) biomes of Brazil. Cockroaches, spiders, earwigs, crickets, and luminescent click beetles were the most common animal interacting with mushrooms. All of these animals may be acting as fungal propagule dispersers and in some cases defense of the mushroom.

Keywords: circadian rhythm, endoperoxide, fungi, arthropod interaction, luciferin, luciferase

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