



INVESTIGATION OF THE ARTIFICIAL NIGHT LIGHTING INFLUENCE IN FIREFLY (COLEOPTERA: LAMPYRIDAE) OCCURRENCE IN THE URBAN AREAS OF CAMPINAS AND SOROCABA MUNICIPALITIES.

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INTRODUCTION

Among the different kinds of pollution, only recently artificial night lighting started to be considered. Several animals have their behavior and ecology disrupted by such effect, including, birds, sea turtles, and insects (Rich and Longcore, 2006). However, studies of the impact of light pollution are still missing. Among animals affected by artificial light, fireflies are especially interesting, because they depend on their own bioluminescence for reproduction, and therefore are very sensitive to environmental levels of light (Lloyd, 2006). Brazil hosts the largest diversity of luminescent beetles in the world (Viviani, 2001), however, the effect of artificial night lighting and urban sprawl on their diversity is just starting to be investigated. During the past years we have catalogued the biodiversity of luminescent species of fireflies in the municipalities of Campinas, Rio Claro and Sorocaba. In this work we report preliminary study of measurement of artificial light intensities in some firefly sites of Campinas, and Sorocaba municipalities, and discuss its impact on the ecology of fireflies.

OBJECTIVES

The aim of this work is to study the influence of artificial night lighting on the ecology and diversity of the fireflies in the urban areas of Campinas and Sorocaba municipalities.

MATERIAL AND METHODS

Artificial Light measurements.

Using a sensitive photometer Skye 310LS, we have measured environmental light intensities at night in several collecting sites.

Collecting and observation sites.

Fireflies were collected and observed in Campinas municipality: Jardim das Palmeiras, Vila Nogueira and Fazenda Santana (Sousas); and Sorocaba municipality: Campus of

Universidade Federal de São Carlos, Jardim Clarice (Votorantim).

Identification of fireflies.

Fireflies and other luminescent beetles were identified by comparison with specimens of the Collection of Bioluminescent Coleoptera, under responsibility of Prof. Viviani at UFSCAR.

RESULTS AND DISCUSSION

Fireflies are found in distinct habitats. Previous studies showed that fireflies start their courtship activities at specific environmental light intensities, and that bioluminescence color and visual spectral sensitivity are adapted to the photic environment where the fireflies are active, the so called contrast hypothesis (Lall *et al.*, 1980). Therefore it is evident that the intensity as well as the chromaticity of environmental light interferes with the bioluminescent communication activity of fireflies, being harmful at high intensities. However, despite fireflies being potential models to investigate the effect of light pollution in the environment, such kind of studies are still missing. We have measured light intensities in several sites either in the urban area of Campinas and Sorocaba and in more preserved areas outside the city boundaries. In strictly open field environments, the following fireflies are found: *Aspsoma lineatum*, *Cratomorphus concolor*, *Cratomorphus sp4*, *Aspsoma sp4*, *Bicellonychia lividipennis*, *B. ornatocollis* and *Aspsoma sp2*. In transition environments between open fields and forest, the following species were commonly found: *Pyrogaster sp1*, *Photinus sp1*, *Aspsoma physonotum*. Preliminary results showed that most species were found in areas with environmental light intensities below 0.2 LUX, which is roughly the light intensity during full moon. The exception were *Aspsoma lineatum* and *Bicellonychia lividipennis*, that were found in sites with 0.85 LUX and 4.5 LUX of sodium vapor lamps, respectively, indicating that these species are more

tolerant to artificial night lighting. In the case of *B. lividepennis*, the onset of their activity in unaffected fields is 4.5 LUX, therefore it is expected the light intensities under such value do not affect their activity. The results are discussed based on the photoecology of these species.

CONCLUSION

Fireflies are very sensitive to environmental levels of light. Therefore a study on the intensities of artificial night lighting in their diversity, can help to analyze the impact of light pollution on firefly ecology, and to select specific fireflies as nocturnal bioindicators.

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