ELECTRIC LIGHT EFFECT ON INSECTS AND WILDLIFE

Abstract

With the significant uptake of LED lighting at night there have been increased concerns regarding the potentially adverse ecological impact upon animal and insect life. For example, baby sea turtles are sensitive to the spectrum typical of starlight and have been attracted away from nests by high colour temperature lighting at night. Likewise, outdoor lighting can disorient birds and fish. Many insects are attracted to shorter visible and near ultraviolet (UV-A) light may alter their normal behaviour. This topic may be particularly important for spectral distributions of outdoor lighting shifting to shorter wavelengths. Over the past century, insect light traps were developed to attract insect pests. However, many insects play important ecological roles, such as pollination of plants or as part of the food chain. Can higher CCT outdoor lighting disturb insects' normal nighttime behaviour? How much does the spectral composition of different sources attract different species, and how strongly or weakly?

Convenor

SLINEY, David, USA Center for Health Promotion and Preventive Medicine, ret. (*confirmed*).

This workshop is organized by CIE Division 6.

Speakers

LIU, Gang, Tianjin University (*confirmed*); TROSCIANKO, Jolyon, Exeter University (*confirmed*); XU, Ting, Tongji University (*confirmed*).

Workshop description

This workshop is aimed at all who produce and use LED lighting at night for commercial, sport, and roadway lighting as we shift away from incandescent, HID, sodium, and fluorescent lamps in all outdoor applications. Can the shift in spectral output have potentially adverse impacts on our natural environment – from plant to animal life? Of particular recent interest has been the impact on night-time pollinators, birds, and other insects. Many species are more sensitive to shorter-wavelength visible light and near-ultraviolet (UV-A). This topic has not been widely explored, and research is needed to better understand the potentially adverse ecological impacts on the food chain. Is there a need to consider changes in LED spectral output or lighting levels to minimize such effects? This workshop is aimed at exploring these questions.

Topics will include:

- Assessing the attraction of narrow-spectrum and broad-spectrum artificial light to nocturnal insects: patterns and predictive models.
- The effect of light at night upon nocturnal pollinators.
- Artificial light at night alters circadian rhythm and neurobehavior in zebrafish.
- What have we learned about the efficacy of different lamp spectra used in insect light-traps?

The workshop will also include an open panel discussion where participants can offer their own insights, participate in the discussion, and ask questions to the presenters.

References

1, Touitou Y, Reinberg A, Touitou D. Association between light at night, melatonin secretion, sleep deprivation, and the internal clock: Health impacts and mechanisms of circadian disruption. Life Sci. 2017 Mar 15;173:94-106. doi: 10.1016/j.lfs.2017.02.008.

2. Aulsebrook AE, Jones TM, Mulder RA, Lesku JA.J Impacts of artificial **light** at **night** on sleep: A review and prospectus. Exp Zool A Ecol Integr Physiol. 2018 Oct;329(8-9):409-418. doi: 10.1002/jez.2189

3. Zielinska-Dabkowska KM, Szlachetko K, Bobkowska K. An **Impact** Analysis of Artificial **Light** at **Night** (ALAN) on Bats. A Case Study of the Historic Monument and Natura 2000 Wisloujscie Fortress in Gdansk, Poland. Int J Environ Res Public Health. 2021 Oct 28;18(21):11327. doi: 10.3390/ijerph182111327.

4. Sanders, D, Gaston, KJ. How ecological communities respond to artificial light at night. J Exp Zool A Ecol Integr Physiol. 2018 Oct;329(8-9):394-400. doi: 10.1002/jez.2157.

5. Briolat, E.S., Gaston, K.J., Bennie, J. et al. Artificial nighttime lighting impacts visual ecology links between flowers, pollinators and predators. Nat Commun 12, 4163 (2021). doi: 1038/s41467-021-24394-0