

Light at Night - Environmental Impacts

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Many of these papers were cited in the following summary report:

Book: Ecological Consequences of Artificial Night Lighting

Editors: Catherine Rich, Travis Longcore

Publisher: Island Press, 2006 ISBN: 1-55963-129-5

<http://www.urbanwildlands.org/ecanlbook.html>

<i>Authors</i>	Able K.P.
<i>Year</i>	1982 Able KP
<i>Report Name</i>	The effects of overcast skies on the orientation of free-flying nocturnal migrations, in Avian navigation (Papi and Wallraff eds.)
<i>Publication</i>	in: Avian navigation: International Symposium on Avian Navigation (ISAN) (Papi and Wallraff eds.)
<i>Issue-page numbers</i>	Springer-Verlag, Berlin. Heidelberg , 40-49
<i>URL</i>	http://books.google.com/books?ei=TuOWTrbrMfSNsALCzoXkBA&ct=result&id=tXAXAQAAIAAJ&dq=Avian+navigation+1982+wallraff&q=Avian+navigation+1982+wallraff+%22o
<i>Abstract</i>	N/A
<i>Keywords</i>	

Authors Adamany, S.L.; Salmon, M.; Witherington, B.E.

Year 1997 Adamany SL, Salmon M, Witherington, BE

Report Name Behavior of sea turtles at an urban beach. III. Costs and benefits of nest caging as a management strategy

Publication Fla. Sci.

Issue-page numbers 60(4): 239-253

URL http://research.myfwc.com/publications/publication_info.asp?id=23814

Abstract At a sea turtle nesting beach in Boca Raton, Florida, all nests are covered with a wire cage to protect the eggs from beach traffic and predators. The front panel of the cage (facing the ocean) is of larger mesh that allows hatchlings to escape. In this study we determined if cages impede hatchling migration. No effect was apparent at dark beach sites but at illuminated beach areas, hatchlings crawled toward lights behind the beach rather than toward the ocean, and were trapped within the cage. Trapped turtles eventually escaped, either later that evening (as lighting was reduced toward midnight) or at dawn (as natural levels of background illumination increased). However at night, enough lighting remained to attract turtles after they left the cage. At dawn, escaped hatchlings crawled to the sea but were probably vulnerable to visual predators. We conclude that at urban sites exposed to luminaires, cage use compromises hatchling survival. Thus at urban rookeries, caging is only effective if coupled with efforts to eliminate beach-front lighting.

Keywords

Authors D G Ainley, R Podolsky, L DeForest, G Spencer

Year 1997 Ainley DG, Podolsky R, DeForest L, Spencer G

Report Name New insights into the status of the Hawaiian Petrel on Kauai

Publication Colonial Waterbirds

Issue-page numbers Volume: 20, Issue: 1, Pages: 24-30

URL <http://www.mendeley.com/research/new-insights-status-hawaiian-petrel-kauai/>

Abstract We present new information, on the basis of observations and an analysis of existing but unpublished data, regarding the present status of the Hawaiian Petrel on Kauai. A consistently used rafting area just offshore of Hanalei, on the north shore of Kauai, is described for the first time. Observations made there in June and July 1993 and 1994, indicate that the population frequenting breeding colonies, on the order of >1000 birds per night during the peak of the visitation cycle, is much larger than previously thought. In contrast, few sightings of this species were made elsewhere around the island. Corroborating these observations were records collected by state and federal biologists on fledglings attracted to lights during their initial flight, 1980-1993, indicating a virtual confinement of the population to the north shore. Data presented also indicate that the nesting season on Kauai may be a few weeks later than on Maui, the only locale where extensive research has been conducted on this species. On Kauai, increasing numbers of Hawaiian Petrel fledglings are being found each year. We propose that this is a result of the increasing numbers of coastal lights, and not an increase in the petrel's population. The increasing numbers found have implications for conservation of this species' population on Kauai.

Keywords

Authors Albarran, M.T., Dolsa A.G.

Year 1998 Albarran MT, Dolsa AG

Report Name La problemática de la Contaminación luminica en la conservación de la Biodiversidad (in catalan)

Publication I Sessió de treball sobre la Contaminació luminica

Issue-page numbers Dept. del Medi Ambient, Generalitat de Catalunya, 29 July 1998.

URL <http://www.um.es/eubacteria/Biodiversidad.pdf>

Abstract The night world, night life, is specially adapted to darkness. about bodies are hidden in it to avoid detection by predators and these latter the advantage for predators can not see their attacks. Many animals have evolved complex systems to adapt to night. others organisms have adapted their lives to take advantage of as many animals and plants that have the highest activity, often only at this time, from the moment the sun sets over the horizon. Many species have evolved exclusively in a world of shadows, overspecialized of animals and plants in the dark for millions of years. the dark was the main factor of its habitat. Now, within a few years this habitat disappears. In many places there is no night. Nocturnal animals do not find their space and reduce their densities. Some species of small area populations to become extinct.

Keywords

Authors O.T. Albert, A. B Salberg, M. Zaferman, G.P. Tarsova

Year 2003 Albert OT, Salberg AB, Zaferman M, Tarsova GP

Report Name Effects of artificial light on trawl catch and behavior of Greenland halibut in front of trawls

Publication In: Deep Sea 2003: conference on the governance and management of deep-sea fisheries, Volume 2

Issue-page numbers P 142

URL http://books.google.com/books?id=izASW0ydfVAC&pg=PA142&lpg=PA142&dq=Artificial+light+influences+on+Halibut+Fishes&source=bl&ots=6uFTROFZXn&sig=_evxADhKUx

Abstract Development of methods for visual surveying in deepwater often rely on the use of constant artificial light. Conclusions relating to vulnerability and other aspects of fish behavior if front of trawls during normal fishing operations may be biased due to the fish reacting in response to the light....

Keywords

Authors Peter Aldhous

Year 2010 Aldhous P

Report Name Time to reclaim the night for wildlife

Publication The New Scientist

Issue-page numbers Volume 207, Issue 2769, 17 July 2010, Pages 8-9

URL <http://www.sciencedirect.com/science/article/pii/S0262407910617071>

Abstract It is rapidly becoming clear that clear that light pollution subtly interferes with the growth, behaviour and survival of many nocturnal species – not just those that hit the headlines

Keywords

Authors A. B. Allema, W. A. H. Rossing, W. van der Werf, B. G. Heusinkveld, T. Bukovinszky, E. Steingröver,

Year 2012 Allema AB, Rossing WAH, van der Werf W, et al.

Report Name Effect of light quality on movement of *Pterostichus melanarius* (Coleoptera: Carabidae)

Publication Journal of Applied Entomology

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1439-0418.2012.01728.x/abstract;jsessionid=04518666AFBD9557D8AD6732558F6135.d04t04?systemMessage=Wiley+Online+Librar>

Abstract Behaviour of nocturnal insects is routinely observed under red light, but it is unclear how the behaviour under red light compares to behaviour in complete darkness, or under a source of white light. Here, we measure movement behaviour of the nocturnal carabid beetle *Pterostichus melanarius* Illiger (Coleoptera: Carabidae) using camera recording under a near-infrared (nir), red or white radiation source. Red light significantly reduced movement speed in females similar to the effect of white light and different from nir. Also movement activity and pause length were affected by radiation source, with a significant difference between nir and white light, and with intermediate values in red light. The results presented here indicate that *P. melanarius* has different movement behaviour under the three radiation sources and suggest that nir rather than red radiation is most appropriate for measuring behaviour in total darkness. However, in the field total darkness is rare both because of natural light sources such as the moon and stars but increasingly also because of ecological light pollution, and therefore red light may still be of use for observing ecologically and practically relevant natural night-time behaviour.

Keywords insects;

Authors A L Alonso-Gómez, N De Pedro, B Gancedo, M Alonso-Bedate, A I Valenciano, M J Delgado

Year 1994 Alonso-Gómez AL, De Pedro N, Gancedo B, et al.

Report Name Ontogeny of ocular serotonin N-acetyltransferase activity daily rhythm in four anuran species

Publication General and Comparative Endocrinology

Issue-page numbers Volume: 94, Issue: 3, Pages: 357-365

URL <http://www.mendeley.com/research/ontogeny-of-ocular-serotonin-nacetyltransferase-activity-daily-rhythm-in-four-anuran-species/>

Abstract The profile of daily ocular serotonin N-acetyltransferase (NAT) rhythm has been examined during the development of four anuran amphibians in different environments and of varying phylogenetic origins: *Xenopus laevis*, *Discoglossus pictus*, *Rana perezi*, and *Bufo calamita*. A significant day/night rhythm of ocular NAT with the acrophase at midnight was first detected at stages 43/44 and 25 in *X. laevis* and *R. perezi*, respectively. Total enzymatic activity increased with body weight throughout development, although both mean levels and amplitudes of NAT activity per milligram of protein significantly decreased; this attenuation of rhythm was more significant in postmetamorphic froglets, and the acrophase was delayed about 1 hr. There were no significant differences in daily NAT profiles before and after metamorphosis in *D. pictus* and *B. calamita*. The amplitude of the NAT rhythm was maximal 10-fold nocturnal values) in *Xenopus* compared with other species (2- to 3-fold).

Keywords

Authors D. Amir, A. Zaralis

Year 1990 Amir D, Zaralis A

Report Name The response of ewes from three local Greek breeds to a long-day skeleton photoperiod during the winter

Publication Theriogenology

Issue-page numbers Volume 33, Issue 6, June 1990, Pages 1323-1331

URL <http://www.sciencedirect.com/science/article/pii/0093691X90900504>

Abstract Adult ewes from three local Greek dairy breeds, pregnant from September matings, were kept under natural photoperiod (control group, n=47) or under a long-day treatment; the latter treatment was simulated with exposure to a 1-h-long 300 lux light pulse, 16 to 17 h after an artificial dawn (light-treated group, n=44) over a 3-moperiod (from December 1 to February 29).

The weight of the newborn lambs and their daily weight gain during the nursing period (6 to 7 wk) were similar in the two groups. The percentage of ovulating ewes during March and April was low (approximately 20%) for both the control and the light-treated groups. However, the mean date of the onset of the sexual season (first cyclic ovulation and estrus) occurred 1 to 2 wk earlier in the treated than in the control ewes. The fertility of the ewes mated at their second seasonal estrus was high (about 75%) and similar in the two groups.

The above results are discussed in connection with the different, and in some cases contradictory, results obtained in other, similar studies.

Keywords sheep; season; artificial light; reproductive performance

Authors H. Andersson, K. Lillpers, L. Rydhmer, M. Forsberg

Year 2000 Andersson H, Lillpers K, Rydhmer L, Forsberg M

Report Name Influence of light environment and photoperiod on plasma melatonin and cortisol profiles in young domestic boars, comparing two commercial melatonin assays

Publication Domestic Animal Endocrinology

Issue-page numbers Volume 19, Issue 4, November 2000, Pages 261-274

URL <http://www.sciencedirect.com/science/article/pii/S0739724000000837>

Abstract Eighteen crossbred boars, three siblings from each of six litters, were distributed randomly among three groups after weaning. The 'Natural long-day' group was housed in a standard room with windows, whereas the 'Artificial long-day' and 'Artificial short-day' groups were housed in light-sealed rooms and under an artificial light regimen (1400 lx). In spring (16–17 hr of light) plasma levels of melatonin and cortisol were measured in samples collected hourly for 24 hr. Two commercial melatonin radioimmunoassays with preassay diethyl ether extraction were compared. Only the assay from Bühlmann Laboratories AG showed low to undetectable melatonin levels during the light-phase and was used for further analysis. Dark-phase melatonin concentrations were higher than light-phase melatonin concentrations ($P < 0.001$). Dark-phase melatonin concentrations were higher in the 'Natural long-day' group than in the 'Artificial long-day' and the 'Artificial short-day' groups ($P < 0.001$). Sire had a significant effect on dark-phase melatonin concentrations ($P < 0.01$), but not on light-phase levels. Cortisol concentrations were higher during the light-phase than during the dark phase, and light-phase cortisol concentrations were higher in the 'Natural long-day' group than in the 'Artificial long-day' and the 'Artificial short-day' groups ($P < 0.01$). This study showed that peripubertal boars express a typical circadian melatonin rhythm under both artificial light regimens and in standard pig stable environment. Natural photoperiod and indoor lighting seem to interact in shaping the melatonin profile in standard stable environment. The great individual variation in the amplitude of the dark-phase melatonin levels could in this study be explained by the different sires.

Keywords

Authors H Andersson, L Rydhmer, K Lundström, M Wallgren, K Andersson, M Forsberg

Year 1998 Andersson H, Rydhmer L, Lundström K, et al.

Report Name Influence of artificial light regimens on sexual maturation and boar taint in entire male pigs

Publication Animal Reproduction Science

Issue-page numbers Volume 51, Issue 1, 16 April 1998, Pages 31-43

URL <http://www.sciencedirect.com/science/article/pii/S0378432098000542>

Abstract To determine if artificial light regimens could influence sexual maturation and boar-taint factors in entire male pigs, 48 weaned, winter-born crossbred males (52–64 days old) were exposed to either a natural photoperiod (January–June, 60°N, Control, n=16) or to one of two artificial photoperiods (1400 lx) in light-sealed rooms. We exposed the Spring group to an increasing artificial photoperiod (January– June, 60°N, n=16) and the Autumn group to a decreasing one (July–December, 60°N, n=16). Plasma samples were collected bi-weekly until the pigs were slaughtered, after reaching 115 kg. Boar taint, carcass composition and reproductive traits were measured at slaughter. Plasma testosterone increased earlier in the Autumn group than in the Control and Spring groups, but the difference was only transient. Estrone sulfate concentrations remained low in the Autumn group, whereas they increased in the Control and Spring groups, indicating a lack of synchrony between testicular androgen and estrogen production in the Autumn group. In the beginning of the study, when the Autumn group was subjected to long days, plasma prolactin was higher in the Autumn group than in the Spring group, but the relation was reversed 14 weeks later when the Spring group was exposed to long days. Weight of reproductive organs (epididymal weight and the total weight of the testes, epididymides and the bulbourethral glands relative to carcass weight) were lower in the Autumn and Spring groups than in the Control group. The Spring and Autumn groups had lower concentrations of skatole in fat compared with the Control group, whereas no clear difference was detected between groups in concentrations of androsterone in fat or in the sensory evaluation of boar taint. Estimated lean meat percentage was lower among animals in both the Autumn and Spring groups compared with the Control group. This study shows that photoperiod can influence male pubertal development and boar-taint factors in the domestic pig.

Keywords Pig-endocrinology; Photoperiod; Puberty; Boar taint

Authors Anonymous

Year 2000 Anon

Report Name LSC EIS 2.3.4 Mysis Relicta

Publication Cornell University

Issue-page numbers sec. 2.3.4.3.4

URL <http://energyandsustainability.fs.cornell.edu/util/cooling/production/lsc/eis/mysisrelicta.cfm>

Abstract The freshwater crustacean Mysis relicta (M. relicta) is an important component of the Cayuga Lake food web. This small pelagic crustacean occurs in the lake's deep cold water (the hypolimnion) and is present in southern Cayuga Lake in the region of the proposed Lake Source Cooling (LSC) intake. The Draft Environmental Impact Statement (DEIS) gives special consideration to this species due to its importance in the food web and its potential vulnerability being entrained by (drawn into) the LSC intake. The LSC research team completed a program of field investigations to assess the animal's life history and distribution within Cayuga Lake in order to evaluate the potential impact of the LSC project. Additional field investigations were conducted to assess the effectiveness of a lighted intake at reducing entrainment of M. relicta.

Keywords webpage

<i>Authors</i>	Anonymous
<i>Year</i>	1998 Anon.
<i>Report Name</i>	Seatrout vs. Light Nuisance
<i>Publication</i>	Scottish Anglers National Association Limited
<i>Issue-page numbers</i>	Web Article
<i>URL</i>	http://www.sana.org.uk/index.php?option=com_content&task=view&id=118&Itemid=2
<i>Abstract</i>	In 1998, Stonehaven & District Angling Association secured a landmark UK court judgement on Light Nuisance (aka light pollution) which has attracted widespread interest from groups as diverse as biologists, civic societies, astronomers and others alarmed about the intrusive impact of ever-increasing artificial light sources on the natural environment and on the wellbeing of the individual. It is of particular importance to game anglers.
<i>Keywords</i>	

Authors Blanca Arango-Gonzalez1#, Andreas Schatz1#, Sylvia Bolz1, Javier Eslava-Schmalbach2, Gabriel Willmann1, Ahmad Zhou1, Eberhart Zrenner1, M. Dominik Fischer1*, Florian

Year 2012 Arango-Gonzalez B, Schatz A, Bolz S, et al.

Report Name Effects of Combined Ketamine/Xylazine Anesthesia on Light Induced Retinal Degeneration in Rats

Publication PLoS ONE

Issue-page numbers 7(4): e35687. doi:10.1371/journal.pone.0035687

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0035687>

Abstract

Objectives

To explore the effect of ketamine-xylazine anesthesia on light-induced retinal degeneration in rats.

Methods

Rats were anesthetized with ketamine and xylazine (100 and 5 mg, respectively) for 1 h, followed by a recovery phase of 2 h before exposure to 16,000 lux of environmental illumination for 2 h. Functional assessment by electroretinography (ERG) and morphological assessment by in vivo imaging (optical coherence tomography), histology (hematoxylin/eosin staining, TUNEL assay) and immunohistochemistry (GFAP and rhodopsin staining) were performed at baseline (ERG), 36 h, 7 d and 14 d post-treatment. Non-anesthetized animals treated with light damage served as controls.

Results

Ketamine-xylazine pre-treatment preserved retinal function and protected against light-induced retinal degeneration. In vivo retinal imaging demonstrated a significant increase of outer nuclear layer (ONL) thickness in the non-anesthetized group at 36 h ($p < 0.01$) and significant reduction one week ($p < 0.01$) after light damage. In contrast, ketamine-xylazine pre-treated animals showed no significant alteration of total retinal or ONL thickness at either time point ($p > 0.05$), indicating a stabilizing and/or protective effect with regard to phototoxicity. Histology confirmed light-induced photoreceptor cell death and Müller cells gliosis in non-anesthetized rats, especially in the superior hemiretina, while ketamine-xylazine treated rats showed reduced photoreceptor cell death (TUNEL staining: $p < 0.001$ after 7 d), thicker ONL and longer IS/OS. Fourteen days after light damage, a reduction of standard flash induced a-wave amplitudes and a-wave slopes ($p = 0.01$) and significant alterations in parameters of the scotopic sensitivity function (e.g. V_{max} of the Naka Rushton fit $p = 0.03$) were observed in non-treated vs. ketamine-xylazine treated animals.

Conclusions

Our results suggest that pre-treatment with ketamine-xylazine anesthesia protects retinas against light damage, reducing photoreceptor cell death. These data support the notion that anesthesia with ketamine-xylazine provides neuroprotective effects in light-induced cell damage.

Keywords

Authors M. Aubé, M. Kocifaj

Year 2012 Aubé M, Kocifaj M

Report Name Using two light-pollution models to investigate artificial sky radiances at Canary Islands observatories

Publication Monthly Notices of the Royal Astronomical Society

Issue-page numbers Volume 422, Issue 1, pages 819–830, May 2012

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2966.2012.20664.x/abstract?systemMessage=Wiley+Online+Library+will+be+disrupted+on+9+June+from+10%3A00-12%3A00+>

Abstract Astronomical observations are increasingly limited by light pollution, which is a product of the over-illumination of the night sky. To predict both the angular distribution of scattered light and the ground-reaching radiative fluxes, a set of models has been introduced in recent decades. Two distinct numerical tools, MSNsRAU and ILLUMINA, are compared in this paper, with the aim of identifying their strengths and weaknesses. The numerical experiment comprises the simulation of spectral radiances in the region of the Canary Islands. In particular, the light fields near the Roque de los Muchachos and Teide observatories are computed under various turbidity conditions. It is shown that ILLUMINA has enhanced accuracy at low elevation angles. However, ILLUMINA is time-consuming because of the two scattering orders incorporated into the calculation scheme. Under low-turbidity conditions and for zenith angles smaller than 70° the two models agree well, and thus can be successfully applied to typical cloudless situations at the majority of observatories. MSNsRAU is well optimized for large-scale simulations. In particular, the grid size is adapted dynamically depending on the distance between a light source and a hypothetical observer. This enables rapid numerical modelling for large territories. MSNsRAU is also well suited for the mass modelling of night-sky radiances after ground-based light sources are hypothetically changed. This enables an optimum design of public lighting systems and a time-efficient evaluation of the optical effects related to different lamp spectra or different lamp distributions. ILLUMINA provides two diagnostic geographical maps to help local authorities concerned about light-pollution control. The first map allows the identification of the relative contribution of each ground element to the observed sky radiance at a given viewing angle, while the second map gives the sensitivity, basically saying how each ground element contributes per lumen installed.

Keywords radiative transfer;

Authors Michael Avery

Year 1976 Avery M

Report Name The effects of a tall tower on nocturnal bird migration - A portable ceilometer study

Publication The Auk

Issue-page numbers Volume: 93, Issue: 2, Pages: 281-291

URL <http://www.mendeley.com/research/effects-tall-tower-nocturnal-bird-migration-portable-ceilometer-study/>

Abstract Much concern has been expressed over bird mortality at lighted, man-made structures (e.g. Kemper 1964, Aldrich et al. 1966), but very little effort has been directed toward understanding why such losses occur and developing means to prevent them. An exception to this was the successful reduction of losses at fixed beam cellometers of some airports by filtering the visible wavelengths out of the beams (Terres 1956). The filtering eliminated the attractiveness of the beams to nocturnal migrants but still permitted the devices to measure cloud ceilings with the ultraviolet light that passed through the filters. Elsewhere losses at the intense fixed cellometer beams were greatly reduced by turning off the devices when birds were noted in the beams (Laskey 1954). In recent years, most airports have converted to rotating beam cellometers that have no noticeable effect on migrants

Keywords

Authors Rafael Avila-Flores and M. Brock Fenton

Year 2005 Avila-Flores R, Fenton MB

Report Name USE OF SPATIAL FEATURES BY FORAGING INSECTIVOROUS BATS IN A LARGE URBAN LANDSCAPE

Publication Journal of Mammalogy

Issue-page numbers Dec 2005 / pg(s) 1193-1204

URL <http://www.bioone.org/doi/abs/10.1644/04-MAMM-A-085R1.1>

Abstract We analyzed the patterns of habitat use by insectivorous bats in Mexico City, one of the largest and most populated cities of the world. We tested the hypotheses that richer patches of food, expected in more vegetated areas, have higher bat activity levels, and that fast-flying species benefit most from urbanization. We compared activity of insectivorous species and relative abundance of insects in 5 habitats (large parks, small parks, illuminated open areas, residential areas, and natural forest). Sampling of bat activity and insects was conducted every 2 weeks in 12 sites per habitat during summer 2002. Measures of bat activity were based on 3,600 one-minute sequences of sound that were recorded and analyzed. The average number of taxa per site was significantly higher in the natural forest than in urban habitats, but overall bat activity was significantly higher in large parks and illuminated open areas than in small parks, residential areas and natural forest. Vespertilionid bats (*Eptesicus fuscus*, *Myotis*, and an unidentified species), along with *Eumops perotis*, occurred almost exclusively in extensive green areas (large parks or natural forest). The molossid *Nyctinomops macrotis* made the broadest use of the urban–natural mosaic, whereas *Tadarida brasiliensis* used urban sites (illuminated areas and large parks) more intensively. Insect abundance was higher in large parks and natural forest, and it was significantly correlated with overall bat activity and with the number of taxa recorded per site. The observed patterns of habitat use and foraging can be explained by considering the flight and echolocation performance of species. Although some species successfully exploited highly urbanized sites, large areas with vegetation are needed to maintain the most diverse insectivorous bat fauna in Mexico City.

Keywords bat activity, echolocation, habitat use, insectivorous bats, megacities, Mexico City, urbanization

Authors Avise J.C., Crawford R.L.

Year 1981 Avise JC, Crawford RL

Report Name A matter of lights and Death

Publication Natural History

Issue-page numbers 90, 11-14

URL N/A

Abstract N/A

Keywords

Authors Backhurst, G. C. and D. J. Pearson
Year 1977 Backhurst GC, Pearson DJ
Report Name Ethiopian region birds attracted to the lights of Ngulia Safari Lodge, Kenya
Publication Scopus
Issue-page numbers 1(4):98-103.
URL N/A
Abstract N/A
Keywords

Authors Baird, J., Emery, R.I., Emery, R.
Year 1959 Baird J, Emery RI, Emery R
Report Name Fall migration: northeastern maritime region
Publication Audubon Field Notes
Issue-page numbers 13(1), 11-13
URL N/A
Abstract N/A
Keywords

Authors Baker, J
Year 1990 Baker J
Report Name Toad aggregations under street lamps
Publication British Herpetology Society Bulletin
Issue-page numbers 31:26-27
URL N/A
Abstract N/A
Keywords

Authors Baldwin, D.H.
Year 1965 Baldwin DH
Report Name Enquiry into the mass mortality of nocturnal migrants in Ontario
Publication The Ontario Naturalist
Issue-page numbers 3(1):3-11
URL <http://www.citeulike.org/group/13602/article/7303325>
Abstract N/A
Keywords

Authors Barringer, Daniel; Walker, C.

Year 2011 Barringer D, Walker, C

Report Name Effects Of Light Pollution On The Movements Of Leptonycteris Curasoae Yerbabuenae In The Tucson Area

Publication American Astronomical Society

Issue-page numbers AAS Meeting #217, #349.07; Bulletin of the American Astronomical Society, Vol. 43, 2011

URL <http://adsabs.harvard.edu/abs/2011AAS...21734907B>

Abstract We used data from the GLOBE at Night project and telemetry tracking data of lesser long-nosed bats obtained by the Arizona Game and Fish Department to study the effects of light pollution on the flight paths of the bats between their day roosts and night foraging areas around the city of Tucson, AZ. With the visual limiting magnitude data from GLOBE at Night, we ran a compositional analysis with respect to the bats' flight paths to determine whether the bats were selecting for or against flight through regions of particular night sky brightness levels. We found that the bats selected for the regions in which the limiting sky magnitudes fell between the ranges of 2.8-3.0 to 3.6-3.8 and 4.4-4.6 to 5.0-5.2, suggesting that the lesser long-nosed bat can tolerate a fair degree of urbanization. We also compared this result to contour maps created with digital Sky Quality Meter data. In this presentation, we present the results from our compositional analysis with respect to the habits of the lesser long-nosed bat. For more information, please visit www.globeatnight.org.

Keywords

Authors Scott F. Basinger, Michael T. Matthes

Year 1980 Basinger SF, Matthes MT

Report Name The effect of long-term constant light on the frog pigment epithelium

Publication Vision Research

Issue-page numbers Volume 20, Issue 12, 1980, Pages 1143-1149

URL <http://www.sciencedirect.com/science/article/pii/0042698980900528>

Abstract Frogs exposed to constant normal room light (40 ft-c.) for 14 months were found to have a swollen pigment epithelium. The principal morphological feature seen in these swollen pigment epithelial cells was a vast array of smooth endoplasmic reticulum, and all of the normal cytoplasmic organelles were displaced to the apical margins of the cells. However, the underlying photoreceptors were undamaged and the outer segment showed no signs of swelling or vesiculation. When a dark/light period was used to induce rod shedding in these animals, shedding, ingestion, and phagocytosis occurred normally. The same general morphological changes, with an absence of swelling, could be induced in normal frogs using bright flashes of light followed by a period of darkness. Thus, the principal morphological effect of long-term constant light on the frog retina is on the pigment epithelium.

Keywords

<i>Authors</i>	Paul Beier
<i>Year</i>	1995 Beier P
<i>Report Name</i>	Dispersal of juvenile cougars in fragmented habitat
<i>Publication</i>	The Journal of Wildlife Management
<i>Issue-page numbers</i>	Vol. 59, No. 2 (Apr., 1995), pp. 228-237
<i>URL</i>	http://www.jstor.org/pss/3808935

Abstract There is little information on the spatiotemporal pattern of dispersal of juvenile cougars (*Felis concolor*) and no data on disperser use of habitat corridors. I investigated dispersal of radio-tagged juvenile cougars (8 M, 1 F) in a California landscape containing 3 corridors (1.5, 4.0, and 6.0 km long) and several habitat peninsulas created by urban growth. Dispersal was usually initiated by the mother abandoning the cub near an edge of her home range. The cub stayed within 300 m of that site for 13-19 days and then dispersed in the direction opposite that taken by the mother. Mean age at dispersal was 18 months (range 13-21 months). Each disperser traveled from its natal range to the farthest part of the urban-wildland edge. Dispersing males occupied a series of small (<30% the area used by ad M in the same time span), temporary (10-298 days) home ranges, usually near the urban-wildland interface, and often with its longest border along that edge. Each of the 3 corridors was used by 1-3 dispersers, 5 of the 9 dispersers found and successfully used corridors, and 2 dispersers entered but failed to traverse corridors. Dispersing cougars will use corridors that are located along natural travel routes, have ample woody cover, include an underpass integrated with roadside fencing at high-speed road crossings, lack artificial outdoor lighting, and have <1 dwelling unit/16 ha.

Keywords

<i>Authors</i>	Beiswenger, R. E
<i>Year</i>	1977 Beiswenger RE
<i>Report Name</i>	Diel patterns of aggregative behavior in tadpoles of <i>Bufo americanus</i> , in relation to light and temperature
<i>Publication</i>	Ecology
<i>Issue-page numbers</i>	58:98-108.
<i>URL</i>	http://www.jstor.org/pss/1935111

Abstract Tadpoles of the American toad, *Bufo americanus*, undergo a diel cycle of distribution and activity. Tadpoles spend the night scattered throughout all but the shallowest parts of ponds, where it is cooler than in nearby deeper areas. They begin swimming and feeding more frequently as light intensity increases in the morning, and when shallow areas begin to warm, they move into them. Most are in aggregations in the upper 1-2 deg. of temperature gradients through midday. During late afternoon, they move from shallow water and by evening are scattered and inactive. This diel cycle is closely correlated with changes in light. Light triggers activity in the morning, and swimming and feeding are depressed on cloudy days. Diminishing light causes individuals to disperse from aggregations and becomes inactive. Once active, tadpoles are attracted to particular microhabitats by heat and light. Temperature gradients are primarily responsible for bringing tadpoles together in sufficient density for aggregations to develop, but thermal effects do not act alone in controlling aggregations.

Keywords AGGREGATIONS, BEHAVIOR, BUFO, DIEL, LIGHT, PATTERNS, TADPOLES, TEMPERATURE

Authors Belton P

Year 1976 Belton P

Report Name Effects of interrupted lights on birds

Publication National Research Council of Canada

Issue-page numbers Issue 73 of Field note

URL http://books.google.com/books/about/Effects_of_interrupted_light_on_birds.html?id=VnfctgAACAAJ

Abstract N/A

Keywords

Authors M Ben-Yami

Year 1976 Ben-Yami M

Report Name Fishing with light

Publication Farnham : Fishing News [for] the Food and Agriculture Organization of the United Nations

Issue-page numbers FAO fishing manuals. Fishing new books Ltd., London.

URL <http://www.worldcat.org/title/fishing-with-light/oclc/02681263>

Abstract Book

Keywords

Authors Rudi Berera, Ivo H.M. van Stokkum, Christian Herrero, Mikas Vengris, Gerdenis Kodis, Rodrigo E. Palacios, Herbert van Amerongen, Rienk van Grondelle, Devens Gust, et al.

Year 2006 Berera R, van Stokkum IHM, Herrero C

Report Name A simple artificial light harvesting dyad as a mimic of nonphotochemical quenching in green plants

Publication Femtochemistry VII

Issue-page numbers Fundamental Ultrafast Processes in Chemistry, Physics, and Biology 2006, Pages 387-390

URL <http://www.sciencedirect.com/science/article/pii/B9780444528216500551>

Abstract Activation of the thermal dissipation of excess energy in plants PSII (nonphotochemical quenching) is linked to the conversion of a 9 double-bond carotenoid (violaxanthin) into an 11 double-bond carotenoid (zeaxanthin) [1]. It has been suggested that the increase in the conjugation length turns the carotenoid from a non-quencher into a quencher of chlorophyll excited states, but there is no unequivocal evidence for this. We present results from transient absorption spectroscopy on a model system made up of a phthalocyanine molecule (Pc) covalently linked to carotenoids with conjugation lengths of 9, 10, or 11. We show that a carotenoid, can quench the Q_y energy of Pc and the conjugation length is critical to the process. By using target analysis of the time-resolved data, we show that the quenching mechanism is energy transfer.

Keywords

Authors Bergen, F. and M. Abs

Year 1997 Bergen F, Abs M

Report Name Etho-ecological study of the singing activity of the blue tit (*Parus caeruleus*), great tit (*Parus major*) and chaffinch (*Fringilla coelebs*).

Publication Journal fuer Ornithologie

Issue-page numbers 138(4):451-467

URL N/A

Abstract The main objective of this study was to determine the extent of influence that a large city's ecological conditions have on the singing behaviour of urbanised birds. The singing activity of selected bird species was examined using the "animal focus sampling" method. The observations were carried out from the beginning of March to the beginning of June 1995 in a 10 ha inner city park, the Westpark (WP) in Dortmund (NRW, Germany). An area of equal size in a forest south of Dortmund, the Niederhofer Wald (NW) was chosen as a control area. In the Westpark the Blue Tit, Great Tit and Chaffinch started to sing significantly earlier in the morning than in the control area. This difference could be due to the artificial lighting of the park at night as well as the noise of traffic. There was no difference in the three species' singing activities between the two areas, but there were differences in the temporal pattern of the Chaffinch's morning singing activity in comparison of the two areas. In the Niederhofer Wald the Chaffinch was almost equally active at all times whereas it showed a pattern similar to the Tit's "dawn chorus" in the Westpark. Food supply, distribution and predictability within the two areas are discussed as causes for this difference. However, the negative correlation between singing activity and the frequency of pedestrians crossing the birds' territories may also play a role. In the Westpark, a correlation between the Chaffinch's singing activity and the frequency of passing pedestrians was noted. The more people crossed the focus animal's territory, the less its singing activity and the more frequently "pinks" occurred. Thus, pedestrians do indeed disturb the Chaffinch which reacts with a change of singing behaviour.

Keywords

Authors Bernard, R.F.
Year 1966 Bernard RF
Report Name Fall migration: western Great Lakes region
Publication Audubon Field Notes
Issue-page numbers 20(1),45-46, 50-53
URL N/A
Abstract N/A
Keywords

Authors Lesley Bertolotti, Michael Salmon
Year 2005 Bertolotti L, Salmon M
Report Name Do embedded roadway lights protect sea turtles?
Publication Environmental Management (2005)
Issue-page numbers Volume: 36, Issue: 5, Pages: 702-710
URL <http://www.mendeley.com/research/do-embedded-roadway-lights-protect-sea-turtles/>
Abstract Street lighting on coastal roadways is often visible at sea turtle nesting beaches, and disrupts the nocturnal orientation of hatchlings as they crawl toward the sea. Our objective was to determine whether an alternative lighting system (light-emitting diodes, embedded in the roadway pavement) prevented orientation disruption. Hatchlings at the beach oriented normally when only the embedded lights were on, or when all lighting was switched off. However, turtles showed poor orientation when street lighting was on. Measurements confirmed that street lighting was scattered to the beach, whereas embedded lighting was not. We conclude that embedded lighting keeps the beach dark and thus protects sea turtles. However, on two overcast evenings, lighting ("skyglow") from nearby development, reflected by cloud cover to the beach, weakened hatchling orientation. Thus, both indirect (reflected) and direct sources of lighting negatively impact the turtles.
Keywords

Authors Douglas F Bertram

Year 1995 Bertram DF

Report Name The roles of introduced rats and commercial fishing in the decline of ancient murrelets on Langara Island, British Columbia

Publication Conservation Biology

Issue-page numbers Volume: 9, Issue: 4, Pages: 865-872

URL <http://www.mendeley.com/research/the-roles-of-introduced-rats-and-commercial-fishing-in-the-decline-of-ancient-murrelets-on-langara-island-british-columbia/>

Abstract I examined the decline of Ancient Murrelets (*Synthliboramphus antiquus*), a small, burrow-nesting seabird, at Langara Island. The island's seabird colony was historically one of the largest colonies of Ancient Murrelets in British Columbia—perhaps in the world—with an estimated 200,000 nesting pairs. I reviewed historical information and compared the results of surveys from 1981 and 1988 that employed the same census protocol. The extent of the colony, a potential index of population size, declined from 101 ha in 1981 to 48 ha in 1988. Burrow density increased during the same period, however, suggesting that the colony had consolidated. In 1988, the population estimate was 24,200 (S.E) 4000 breeding pairs compared to 22,000 (S.E) 3700 in 1981. In 1988, 29% of the burrows that were completely searched contained bones of Ancient Murrelets. Bones were most common in burrows located in abandoned areas of the colony and were least common where burrow occupancy was high. The discovery of adult Ancient Murrelets killed in their burrows by introduced rats, combined with the high proportion of burrows with bones, suggests that rats (*Rattus rattus* and *R. norvegicus*) have contributed significantly to the decline of the population. In addition, the presence and activities of a salmon-fishing fleet in the 1950s and 1960s may also be linked to the decline of the Langara Ancient Murrelet population during that period because these fisheries are known to have caused heavy mortality through fatal light attraction and drowning in gill nets. The combined effects of ongoing predation by introduced rats and—to a lesser extent—previous, episodic fishery-induced mortality are probable causes for the population decline.

Keywords

Authors J C Besharse, P Witkovsky

Year 1992 Besharse JC, Witkovsky P

Report Name Light-evoked contraction of red absorbing cones in the *Xenopus* retina is maximally sensitive to green light

Publication Visual Neuroscience

Issue-page numbers Volume: 8, Issue: 3, Pages: 243-249 PubMed: 1547160

URL <http://www.mendeley.com/research/lightevoked-contraction-red-absorbing-cones-xenopus-retina-maximally-sensitive-green-light/>

Abstract To test the hypothesis that light-evoked cone contraction in eye cups from *Xenopus laevis* is controlled through a direct mechanism initiated by the cone's own photopigment, we conducted spectral-sensitivity experiments. We estimate that initiation of contraction of red absorbing cones (611 nm) is 1.5 log units more sensitive to green (533 nm) than red (650 nm) light stimuli. The difference is comparable to that predicted from the spectral-sensitivity function of the green absorbing, principal rod (523 nm). Furthermore, 480-nm and 580-nm stimuli which are absorbed nearly equally by the principal rod have indistinguishable effects on cone contraction. We also found that light blockade of nighttime cone elongation is much more sensitive to green than to red light stimuli. Our observations are inconsistent with the hypothesis tested, and suggest that light-regulated cone motility is controlled through an indirect mechanism initiated primarily by the green absorbing, principal rod.

Keywords

Authors A Bhattacharya, Y D Mishra, A H Naqvi, A K Sen

Year 1995 Bhattacharya A, Mishra YD, Naqvi AH, Sen AK

Report Name Attraction of some insects associated with lac towards various coloured lights

Publication Journal of Insect Science

Issue-page numbers Volume: 8, Issue: 2, Pages: 205-206

URL <http://www.mendeley.com/research/attraction-some-insects-associated-lac-towards-various-coloured-lights/>

Abstract The attraction of 8 insects associated with *Kerria lacca* to blue, yellow, red and natural light was tested in the laboratory. The insects tested were: the predators *Eublemma amabilis* and *Holcocera pulverea* *Pseudohypatopa pulverea*; their parasitoids *Bracon greeni*, *Pristomerus sulci* and *Apanteles tachardiae*; and the parasitoids of *K. lacca*, *Tetrastichus purpureus* *Aprostocetus purpureus*, *Parechthrodryinus clavicornis* and *Tachardiaephagus tachardiae*. All the insects tested showed a high degree of attraction towards natural light and low attraction to blue. Marked differences were observed in the behaviour of the predators and parasitoids for yellow and red lights.

Keywords

Authors James D. Biggs, Tiffany Fouché, Frank Bilki, Marjan G. Zadnik

Year 2012 Biggs JD, Fouché T, Bilki F, Zadnik MG

Report Name Measuring and mapping the night sky brightness of Perth, Western Australia

Publication Monthly Notices of the Royal Astronomical Society

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2966.2012.20416.x/full>

Abstract

In order to study the light pollution produced in the city of Perth, Western Australia, we have used a hand-held sky brightness meter to measure the night sky brightness across the city. The data acquired facilitated the creation of a contour map of night sky brightness across the 2400 km² area of the city – the first such map to be produced for a city. Importantly, this map was created using a methodology borrowed from the field of geophysics – the well proven and rigorous techniques of geostatistical analysis and modelling.

A major finding of this study is the effect of land use on night sky brightness. By overlaying the night sky brightness map on to a suitably processed Landsat satellite image of Perth we found that locations near commercial and/or light industrial areas have a brighter night sky, whereas locations used for agriculture or having high vegetation coverage have a fainter night sky than surrounding areas. Urban areas have intermediate amounts of vegetation and are intermediate in brightness compared with the above-mentioned land uses. Regions with a higher density of major highways also appear to contribute to increased night sky brightness.

When corrected for the effects of direct illumination from high buildings, we found that the night sky brightness in the central business district (CBD) is very close to that expected for a city of Perth's population from modelling work and observations obtained in earlier studies. Given that our night sky brightness measurements in Perth over 2009 and 2010 are commensurate with that measured in Canadian cities over 30 years earlier implies that the various lighting systems employed in Perth (and probably most other cities) have not been optimised to minimize light pollution over that time.

We also found that night sky brightness diminished with distance with an exponent of approximately -0.25 ± 0.02 from 3.5 to 10 km from the Perth CBD, a region characterized by urban and commercial land use. For distances from 10 out to about 40 km from the CBD the radial variation of night sky brightness steepens to have an exponent value of approximately -1.8 ± 0.2 . This steepening is associated with land use because vegetation cover increases with further distance from the CBD.

Keywords scattering;

Authors Sue Binkley, Karen Mosher, Frances Rubin, Beatrix White

Year 1988 Binkley S, Mosher K, Rubin F, White B

Report Name Xenopus Tadpole Melanophores Are Controlled by Dark and Light and Melatonin Without Influence of Time of Day

Publication Journal of Pineal Research

Issue-page numbers Volume 5, Issue 1, pages 87–97, January 1988

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-079X.1988.tb00771.x/abstract>

Abstract Melanophores were studied in tadpoles of the South African clawed toad, *Xenopus laevis*, during the first week after hatching (stages 46–49) at 25°C. The tadpoles had melanophores with dispersed melanosomes in the light and punctate melanophores in the dark in LD12:12. The melanophores remained punctate in constant dark and the melanosomes remained dispersed in constant light. Lights-out (in the light-time of LD12:12) caused the melanophores to become punctate, which occurred more quickly than the dispersion of melanosomes, which commenced when the lights were turned on (in the dark-time of LD12:12). Melanophores with dispersed melanosomes in tadpoles (in constant light) became punctate in response to a series of melatonin concentrations (0.2–5 ng/ml) in their bathing water irrespective of the time of day melatonin was administered. An image-analysis technique for assessing melanophore responses was tested.

Keywords pineal; circadian; rhythm

Authors Brittany L Bird, Lyn C Branch, Deborah L Miller

Year 2004 Bird BL, Branch LC, Miller DL

Report Name Effects of coastal lighting on foraging behavior of beach mice

Publication Conservation Biology

Issue-page numbers Volume: 18, Issue: 5, Pages: 1435-1439

URL <http://www.mendeley.com/research/effects-of-coastal-lighting-on-foraging-behavior-of-beach-mice-1/>

Abstract Introduction of artificial light into wildlife habitat represents a rapidly expanding form of human encroachment, particularly in coastal systems. Light pollution alters the behavior of sea turtles during nesting; therefore, long-wavelength lights-low-pressure sodium vapor and bug lights-that minimize impacts on turtles are required for beach lighting in Florida (U.S.A.). We investigated the effects of these two kinds of lights on the foraging behavior of Santa Rosa beach mice (*Peromyscus polionotus leucocephalus*). We compared patch use and giving-up densities of mice for experimental food patches established along a gradient of artificial light in the field. Mice exploited fewer food patches near both types of artificial light than in areas with little light and harvested fewer seeds within patches near bug lights. Our results show that artificial light affects the behavior of terrestrial species in coastal areas and that light pollution deserves greater consideration in conservation planning.

Keywords artificial illumination, foraging behavior, light pollution

Authors Bird, Stephanie and Parker, Joel
Year 2011 Bird S, Joel P
Report Name Low levels of light pollution may block male glow-worm's (Lampyris noctiluca L.) ability to locate females
Publication Journal of Insect Conservation
Issue-page numbers (Submitted)
URL <http://eprints.soton.ac.uk/186631/>

Abstract Light pollution has been proposed as a factor in the reported decline of Lampyris noctiluca as it has the potential to interfere with reproductive signalling. To test this effect on the ability of males to find females, imitation females were set out under light polluted and control conditions at varying light intensities with the numbers of males attracted to each being recorded. Very low levels of light pollution were found to significantly interfere with phototaxis: no males were attracted at either 0.3 or 0.18 lux, with a custom model predicting 0.065 lux as a critical value below which the light no longer has an effect. These illumination levels are much lower than that of 1.5 lux which is recommended by local city councils in Britain to light footpaths and well below any previous published levels of light shown to affect this species. A survey of female L. noctiluca was also conducted with their number and distribution being recorded; a trend towards female clumping was observed but was not statistically significant.

Keywords

Authors Biswas NM, Chakraborty J, Chanda S, Sanyal S.
Year 1978 Biswas NM, Chakraborty J, Chanda S, Sanyal S.
Report Name Effect of continuous light and darkness on the testicular histology of toad (Bufo melanostictus)
Publication Endocrinol Jpn
Issue-page numbers Apr;25(2):177-80.
URL <http://www.ncbi.nlm.nih.gov/pubmed/668630>

Abstract Continuous darkness decreases spermatogenesis as well as Leydig cell function whereas continuous illumination suppresses spermatogenesis along with increased Leydig cell activity.

Keywords

Authors Bjorge, R.R.

Year 1987 Bjorge RR

Report Name Bird kill at an Oil Industry Flare Stack in Northwest Alberta

Publication The Canadian Field-Naturalist

Issue-page numbers v101, #3, P 346

URL <http://www.biodiversitylibrary.org/item/89248>

Abstract Approximately 2000 migrating passerines died within 75 m of a 104 m oil industry flare stack in northwestern Alberta during late May 1980.

Keywords Bird kill, passerines, Alberta, flare stack

Authors D Blake, A M Hutson, P A Racey, J Rydell, J R Speakman

Year 1994 Blake D, Hutson AM, Racey PA, et al.

Report Name Use of lamplit roads by foraging bats in southern England

Publication Journal of Zoology

Issue-page numbers Volume: 234, Issue: 3, Pages: 453-462

URL <http://www.mendeley.com/research/use-of-lamplit-roads-by-foraging-bats-in-southern-england/>

Abstract Roads illuminated by white streetlamps attracted three times more foraging bats (mostly *Pipistrellus pipistrellus*) than did roads lit by orange streetlamps or unlit roads (3.2, 1.2 and 0.7 bat passes/km, respectively). More insects flew around white lamps than around orange lamps (mean 0.67 and 0.083 insects per lamp, respectively). The mean number of bat passes recorded in any 1-km section of road was positively correlated to the number of white streetlamps along the section, and also, independently, to the amount of trees and hedgerows. Bat activity was not related to the number of houses along the road, ambient temperature or cloud cover. The attractive effect of the lamps on the bats was diminished in windy weather.

Keywords

Authors Blough, D.S.

Year 1955 Blough DS

Report Name Method for tracing dark adaptation in the Pigeon

Publication Science

Issue-page numbers Vol. 121 no. 3150 pp. 703-704

URL <http://www.sciencemag.org/content/121/3150/703.extract>

Abstract N/A

Keywords

Authors Sándor Boldogh, Dénes Dobrosi, Péter Samu

Year 2007 Boldogh S, Dobrosi D, Samu P

Report Name The effects of the illumination of buildings on house-dwelling bats and its conservation consequences

Publication Acta Chiropterologica Published by: Museum and Institute of Zoology, Polish Academy of Sciences

Issue-page numbers 9(2):527-534. 2007 doi: 10.3161/1733-5329(2007)9[527:TEOTIO]2.0.CO;2

URL <http://www.bioone.org/doi/abs/10.3161/1733-5329%282007%299%5B527%3ATEOTIO%5D2.0.CO%3B2>

Abstract As the illumination of buildings at night increases, light pollution and negative impacts on wildlife also increase. In order to assess the effect of direct lighting on house-dwelling bats, we examined colonies of *Rhinolophus ferrumequinum*, *Myotis emarginatus* and *M. oxygnathus* in illuminated and non-illuminated buildings found in close proximity to each other. We investigated the onset and timing of nocturnal emergence and measured the body mass and the forearm length of juvenile bats. Results show that bright artificial lighting delays the onset or significantly prolongs the duration of emergence and, in the worst cases, may destroy the whole colony. Juveniles are significantly smaller in illuminated buildings than in non-illuminated ones. The differences in length of the forearm and in body mass may suggest that the parturition time starts later and/or the growth rate is lower in bats living in illuminated buildings. Thus, the illumination of buildings could have serious implications for the conservation of house-dwelling bat colonies.

Keywords light pollution, bat, conservation, artificial roost, *Myotis oxygnathus*, *M. emarginatus*

Authors Bertil Borg, Cecilia Bornestaf, Anna Hellqvist, Monika Schmitz and Ian Mayer

Year 2004 Borg B, Bornestaf C, Hellqvist A, et al.

Report Name Mechanisms in the Photoperiodic Control of Reproduction in the Stickleback

Publication Behaviour

Issue-page numbers Vol. 141, No. 11/12, Proceedings of the Fourth International Conference on Stickleback Behaviour and Evolution (Nov. - Dec., 2004), pp. 1521-1530

URL <http://www.jstor.org/pss/4536220>

Abstract In sticklebacks, sexual maturation is stimulated by long photoperiods but not by short photoperiods, even at high temperatures. Extra-retinal photoreception can mediate this response, and appears to be more important than retinal photoreception. Although plasma melatonin levels are high at night and low during the day, experiments using melatonin administration via the water indicate that melatonin is of no or little importance for the photoperiodic response. Androgens can be aromatised to estrogens in the stickleback brain. Treatment with aromatase inhibitors stimulates maturation of males also under short photoperiod, suggesting that aromatase is involved in the suppressive actions of short photoperiod. Expression of both follicle stimulating hormone (FSH)- β and luteinizing hormone (LH)- β is higher under long than under short photoperiod. FSH- β is controlled by a negative steroid feedback on the brain-pituitary-gonad axis under short photoperiod and by a positive steroid feedback under long photoperiod. It is suggested that the former can suppress reproduction under short photoperiod and the latter can stimulate breeding under long photoperiod.

Keywords

Authors Borg, V

Year 1996 Borg V

Report Name Death of the night

Publication Geographical Magazine

Issue-page numbers vol.68 no.10: 56

URL <http://runners.ritsumei.ac.jp/cgi-bin/swets/hold-query-e?mode=0&key=&idxno=10217799>

Abstract Night light pollution is becoming an increasingly important environmental problem as well as an impediment to people enjoying the panorama offered by the stars. Certain animals, such as sea turtles in the Mediterranean and migratory birds that fly by night, are disturbed in their reproductive and migratory habits by the excess light being given off by lit towns and cities. The answer is to cap night lights to reduce the glare that is given off into the sky.

Keywords

Authors Stéphanie Bourgeois, Emmanuelle Gilot-Fromont, Anne Viallefont, François Boussamba, Sharon L. Deem

Year 0 Bourgeois S, Gilot-Fromont E, Viallefont A, et al.

Report Name Influence of artificial lights, logs and erosion on leatherback sea turtle hatchling orientation at Pongara National Park, Gabon

Publication Biological Conservation

Issue-page numbers Volume 142, Issue 1, January 2009, Pages 85-93

URL <http://www.sciencedirect.com/science/article/pii/S0006320708003704>

Abstract The coast of Gabon is one of the most important nesting sites for the endangered leatherback sea turtle *Dermochelys coriacea*. In this study, hatchling orientation was recorded during natural emergences at Pongara National Park, Gabon. This nesting beach is located close to both the capital of Gabon and a developing resort area, Pointe Denis. Under natural conditions most sea turtle hatchlings emerge at night and orient to the ocean by crawling away from dark, high silhouettes landward towards the bright, low seaward horizons. Artificial lights interfere with natural cues and disrupt hatchling orientation. The relative influence of artificial lights, logs and erosion were assessed on the nesting beach in Pongara National Park using a linear mixed model. We found that the attraction to artificial lights was higher than the effect of silhouette cues landward alone, but could be balanced by the simultaneous presence of the moon. Based upon these results, we recommend combining light management in the resort area to reduce the light pollution on the nesting beach and reinforcement of natural cues landward to minimize the effect of the remaining light pollution from the capital.

Keywords *Dermochelys coriacea*; Gabon; Hatchlings; Leatherback sea turtle; Orientation; Photopollution

Authors Parrish Brady and Molly Cummings

Year 2010 Brady P, Cummings M

Report Name Differential Response to Circularly Polarized Light by the Jewel Scarab Beetle *Chrysina gloriosa*

Publication The American Naturalist

Issue-page numbers Vol. 175, No. 5 (May 2010), pp. 614-620

URL <http://www.jstor.org/pss/10.1086/651593>

Abstract Circularly polarized light is rare in the terrestrial environment, and cuticular reflections from scarab beetles are one of the few natural sources. *Chrysina gloriosa* LeConte 1854, a scarab beetle found in montane juniper forests of the extreme southwestern United States and northern Mexico, are camouflaged in juniper foliage; however, when viewed with right circularly polarizing filters, the beetles exhibit a stark black contrast. Given the polarization-specific changes in the appearance of *C. gloriosa*, we hypothesized that *C. gloriosa* can detect circularly polarized light. We tested for phototactic response and differential flight orientation of *C. gloriosa* toward different light stimuli. *Chrysina gloriosa* exhibited (a) positive phototaxis, (b) differential flight orientation between linear and circularly polarized light stimuli of equal intensities, and (c) discrimination between circularly polarized and unpolarized lights of different intensities consistent with a model of circular polarization sensitivity based on a quarter-wave plate. These results demonstrate that *C. gloriosa* beetles respond differentially to circularly polarized light. In contrast, *Chrysina woodi* Horn 1885, a close relative with reduced circularly polarized reflection, exhibited no phototactic discrimination between linear and circularly polarized light. Circularly polarized sensitivity may allow *C. gloriosa* to perceive and communicate with conspecifics that remain cryptic to predators, reducing indirect costs of communication.

Keywords

<i>Authors</i>	Bretherton B.J.
<i>Year</i>	1902 Bretherton BJ
<i>Report Name</i>	The destruction of birds by lighthouses
<i>Publication</i>	Osprey
<i>Issue-page numbers</i>	1(5):76-78
<i>URL</i>	N/A
<i>Abstract</i>	N/A
<i>Keywords</i>	

Authors	Charlotte Bruce-White and Matt Shardlow
Year	2011 Bruce-White C, Shardlow M
Report Name	A Review of the Impact of Artificial Light on Invertebrates
Publication	Buglife – The Invertebrate Conservation Trust
Issue-page numbers	Buglife – The Invertebrate Conservation Trust
URL	http://www.kentbutterflies.org/kentmoths/downloads/pdfs/others/Buglifereport.pdf

Abstract

Developments in lighting technology have led to major increases in the distribution and intensity of artificial light in the past few decades and its growth is continuing largely unchecked.

2. Artificial light has the potential to significantly disrupt ecosystems and it has long been of concern to conservationists. It is widely observed that some invertebrates, such as moths, are attracted to artificial lights at night. In addition the polarisation of light by shiny surfaces is a significant problem as it attracts aquatic insects, particularly egg laying females, away from water, and reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates.

3. Artificial light can significantly disrupt the natural light/dark patterns. Many invertebrates depend on the natural rhythms of day-night and seasonal and lunar changes to light levels. As a result artificial lighting has several negative impacts on a wide range of invertebrates including disrupting their feeding, breeding and movement which may reduce and fragment populations.

4. Invertebrates make up the majority of biodiversity on earth and are vital to ecosystems. Many invertebrates are also listed as national priority species for conservation under the UK Biodiversity Action Plan (BAP). It is therefore important to minimise the impacts of artificial light on invertebrate populations.

5. Action to reduce artificial light impacts is necessary and justified now. Although further research is required to fully understand the impacts of artificial light on invertebrates and the environment as a whole, the precautionary principle applies and enough is known to take action now. This report makes several recommendations that would reduce and mitigate the negative effects that artificial light has on invertebrates.

Keywords

Authors B. Bruderer, D. Peter and T. Steuri

Year 1999 Bruderer B, Peter D, Steuri T

Report Name Behaviour of migrating birds exposed to X-band radar and a bright light beam

Publication J Exp Biol

Issue-page numbers 202, 1015-1022.

URL <http://jeb.biologists.org/content/202/9/1015>

Abstract Radar studies on bird migration assume that the transmitted electromagnetic pulses do not alter the behaviour of the birds, in spite of some worrying reports of observed disturbance. This paper shows that, in the case of the X-band radar 'Superfledermaus', no relevant changes in flight behaviour occurred, while a strong light beam provoked important changes. Large sets of routine recordings of nocturnal bird migrants obtained using an X-band tracking radar provided no indication of differing flight behaviour between birds flying at low levels towards the radar, away from it or passing it sideways. Switching the radar transmission on and off, while continuing to track selected bird targets using a passive infrared camera during the switch-off phases of the radar, showed no difference in the birds' behaviour with and without incident radar waves. Tracking single nocturnal migrants while switching on and off a strong searchlight mounted parallel to the radar antenna, however, induced pronounced reactions by the birds: (1) a wide variation of directional shifts averaging 8 degrees in the first and 15 degrees in the third 10 s interval after switch-on; (2) a mean reduction in flight speed of 2–3 m s⁻¹ (15–30 % of normal air speed); and (3) a slight increase in climbing rate. A calculated index of change declined with distance from the source, suggesting zero reaction beyond approximately 1 km. These results revive existing ideas of using light beams on aircraft to prevent bird strikes and provide arguments against the increasing use of light beams for advertising purposes.

Keywords

Authors Anika Brüning, Franz Hölker and Christian Wolter

Year 0 Brüning A, Hölker F, Wolter C

Report Name Artificial light at night: implications for early life stages development in four temperate freshwater fish species

Publication Aquatic Sciences - Research Across Boundaries

Issue-page numbers Volume 73, Number 1, 143-152, DOI: 10.1007/s00027-010-0167-2

URL <http://www.springerlink.com/content/g172050tng55554m/>

Abstract Flora and fauna have both evolved under a natural cycle of light and dark. But especially in urban areas, the night is now increasingly disturbed by artificial light. Many traits and behaviours in fish are triggered by a circadian clock, for example hatching and swim bladder inflation, which predominantly take place at dusk or night. As lighting becomes brighter and extends farther into rural areas, the distinction between day and night becomes increasingly blurred. Therefore, the loss of diurnal trigger by artificial light at night was hypothesized having deleterious effects on these traits and impact fish reproduction. To assess these effects, eggs of four native freshwater fishes, Eurasian perch *Perca fluviatilis*, roach *Rutilus rutilus*, bleak *Alburnus alburnus* and chub *Leuciscus cephalus*, were incubated under two different light conditions: a photoperiod of 14 h light:10 h darkness (LD) and continuous illumination (LL). The time to hatch and swim bladder inflation was recorded. The species showed inconsistent reactions to the light treatments. In roach and bleak, the time to 50% hatch was longer in LL, whereas continuous lighting had an accelerating effect in chub. Incubation in LL elongated the hatching period in perch and roach and, in perch, the onset of darkness seemed to trigger hatching. The swim bladder inflation was significantly promoted by continuous light in chub and bleak but was not affected in roach. In conclusion, nocturnal artificial illumination could have an effect on hatching and initial swim bladder filling by masking the day–night-change and thereby diminish the trigger effect. However, the reactions were species specific and the increase in variation indicated a lack of diurnal triggering, whilst a general deleterious effect of artificial light at night has not been identified on early life stages.

Keywords Light pollution, Artificial light, Hatching, Initial swim bladder inflation, Freshwater fish

Authors Bryant W. Buchanan

Year 1993 Buchanan BW

Report Name Effects of enhanced lighting on the behaviour of nocturnal frogs

Publication Animal Behaviour

Issue-page numbers Volume 45, Issue 5, May 1993, Pages 893-899

URL <http://www.sciencedirect.com/science/article/pii/S0003347283711097>

Abstract Biologists studying anuran amphibians usually assume that artificial, visible light does not affect the behaviour of nocturnal frogs. This assumption was tested in a laboratory experiment. The foraging behaviour of grey treefrogs, *Hyla chrysoscelis*, was compared under four lighting conditions: ambient light (equivalent to bright moonlight, 0.003 lx), red-filtered light (4.1 lx), low-intensity 'white' light (3.8 lx), and high-intensity 'white' light (12.0 lx). The treatments were chosen to correspond to standard methods of field observation of frog behaviour. The foraging behaviour of frogs in the four treatments was observed using infra-red light that was invisible to the frogs. The ability of the frogs to detect, and subsequently consume prey was significantly reduced under all of the enhanced light treatments relative to the ambient light treatment. Thus, the use of artificial light, within the visible spectrum of the frogs' eyes, can influence the outcome of nocturnal behavioural observations. These results lead to the recommendation that anuran biologists use infra-red or light amplification devices when changes in frogs' visual capabilities may influence the conclusions drawn from a study.

Keywords

Authors Buchanan, B. W.

Year 1998 Buchanan BW

Report Name Low-illumination prey detection by squirrel treefrogs

Publication Journal of Herpetology

Issue-page numbers 32:270-274

URL <http://www.jstor.org/pss/1565308>

Abstract N/A

Keywords

Authors Erwin Bünning and Ilse Moser

Year 1969 Bünning E, Moser I

Report Name INTERFERENCE OF MOONLIGHT WITH THE PHOTOPERIODIC MEASUREMENT OF TIME BY PLANTS, AND THEIR ADAPTIVE REACTION

Publication PNAS

Issue-page numbers April 1, 1969 vol. 62 no. 4 1018-1022

URL <http://www.pnas.org/content/62/4/1018.short>

Abstract Threshold values of photoperiodic time-measurements correspond approximately to moonlight intensities. Experiments with Glycine and Euglena reveal that this is also the threshold value for synchronization of the circadian cycle. Saturation of this reaction is reached with 10 lx in 12:12 hr light-dark cycles. Thus, moonlight might disturb time measurement.

In Glycine, Arachis, and Trifolium the intensity of the light coming from the moon to the upper surface of the leaf is reduced by circadian leaf movement to values between 5 and 20 per cent (or even less than 5 per cent) of full-moon light intensity. Such a reduction eliminates the disturbing effects of moonlight. This finding indicates that leaf movements have an adaptive value of the kind that Darwin sought to identify. It also indicates that the behavior of the upper leaf epidermis as a "sense organ for light"¹³ has an adaptive value.

In the short-day plants *Perilla ocymoides* and *Chenopodium amaranticolor*, a specific photoperiodic phenomenon was found that counteracts the disturbing effect of moonlight. Here light intensities similar to those of moonlight, introduced during the night, promote flowering instead of inhibiting it.

Keywords

Authors Francis M. Bush

Year 1963 Bush FM

Report Name Effects of light and temperature on the gross composition of the toad, *Bufo fowleri*

Publication Journal of Experimental Zoology

Issue-page numbers Volume 153, Issue 1, pages 1–13, June 1963

URL <http://onlinelibrary.wiley.com/doi/10.1002/jez.1401530102/abstract>

Abstract N/A

Keywords

Authors Filipe Canário, Alexandre Hespanhol Leitão, and Ricardo Tomé

Year 2012 Canário F, Leitão AH, Tomé R

Report Name Predation Attempts by Short-eared and Long-eared Owls on Migrating Songbirds Attracted to Artificial Lights

Publication Journal of Raptor Research

Issue-page numbers 46(2):232-234. 2012

URL <http://www.bioone.org/doi/abs/10.3356/JRR-11-15.1>

Abstract

Keywords Asio otus, Long-eared Owl, Asio flammeus, Short-eared Owl, artificial light, migration, predation

Authors W. E. Carey, D. L. G. Noakes

Year 1981 Carey WE, Noakes DLG

Report Name <http://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.1981.tb05832.x/abstract>

Publication Journal of Fish Biology

Issue-page numbers Volume 19, Issue 3, pages 285–296, September 1981

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.1981.tb05832.x/abstract>

Abstract The photobehaviour of young rainbow trout was studied from the time of hatching to completed emergence using an artificial turf substrate incubation system. At all light energies tested, free-embryos initiated a substantial downward movement and rates of fish descent did not appear to reflect the order of light energy levels. A nocturnal activity rhythm was established early in the downward phase. The occurrence of a rapid photoresponse shift 21 days after hatching coincided with the synchronous onset of emergence in all fish groups and the depletion of 85% (by volume) of the yolk reserve. Concurrent morphological observations indicated that the photoresponse change occurred when fish were about 25 mm long, and when paired and median fins were fully developed.

Keywords

Authors Casagrande, R., Giulini, P.
Year 1983 Casagrande R, Giulini P
Report Name Illuminazione pubblica e verde urbano (in Italian)
Publication in: L'albero, l'uomo, la città
Issue-page numbers Proceedings, ed. P.Giulini (Padova: Signum edizioni), 42-44.
URL N/A
Abstract N/A
Keywords

Authors Roberta Casagrande, Patrizio Guilini
Year 2000 Casagrande R, Guilini P
Report Name City lights and urban green
Publication Measuring and Modelling Light Pollution
Issue-page numbers Mem. Soc. Astron. It. vol.71 - no. 1, Pages: 55-59
URL <http://www.mendeley.com/research/city-light-urban-green/>
Abstract
Keywords

Authors C. M. C. Catto, P. A. Racey, P. J. Stephenson

Year 1995 Catto CMC, Racey PA, Stephenson PJ

Report Name Activity patterns of the serotine bat (*Eptesicus serotinus*) at a roost in southern England

Publication Journal of Zoology

Issue-page numbers Volume 235, Issue 4, pages 635–644, April 1995

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7998.1995.tb01774.x/abstract>

Abstract Activity patterns and emergence times of a colony of serotine bats, *Eptesicus serotinus*, were studied in southern England. Time of emergence from the day roost varied over the summer but was strongly correlated with sunset. Mean emergence time was 11.6 ± 7.7 min after sunset. Early in summer, activity patterns were unimodal, becoming bimodal during mid- to late pregnancy and multimodal in early to mid-lactation. When juveniles were volant, activity patterns became unimodal again. Periods of low ambient temperature were associated with reduced activity. The duration of the first foraging flight decreased as pregnancy progressed, possibly as a result of the greater wing-loading caused by increased body mass. However, the first foraging flight increased in duration during the course of lactation, probably in response to a combination of increased night length and the increased energetic demands of milk production. It is concluded that seasonal variation in the length of time spent away from the roost in the serotine is related to reproductive status, night length and ambient temperature. It is suggested that the more northerly distribution of this bat in continental Europe may be due to differences in habitat use and diet.

Keywords

Authors C. Chalkias, M. Petrakisb, B. Psilogloub, M. Lianou

Year 2006 Chalkias C, Petrakis M, Psilogloub B, Lianou M

Report Name Modelling of light pollution in suburban areas using remotely sensed imagery and GIS

Publication Journal of Environmental Management

Issue-page numbers Volume 79, Issue 1, April 2006, Pages 57-63

URL <http://www.sciencedirect.com/science/article/pii/S0301479705002161>

Abstract This paper describes a methodology for modelling light pollution using geographical information systems (GIS) and remote sensing (RS) technology. The proposed approach attempts to address the issue of environmental assessment in sensitive suburban areas. The modern way of life in developing countries is conducive to environmental degradation in urban and suburban areas. One specific parameter for this degradation is light pollution due to intense artificial night lighting. This paper aims to assess this parameter for the Athens metropolitan area, using modern analytical and data capturing technologies. For this purpose, night-time satellite images and analogue maps have been used in order to create the spatial database of the GIS for the study area. Using GIS advanced analytical functionality, visibility analysis was implemented. The outputs for this analysis are a series of maps reflecting direct and indirect light pollution around the city of Athens. Direct light pollution corresponds to optical contact with artificial night light sources, while indirect light pollution corresponds to optical contact with the sky glow above the city. Additionally, the assessment of light pollution in different periods allows for dynamic evaluation of the phenomenon. The case study demonstrates high levels of light pollution in Athens suburban areas and its increase over the last decade.

Keywords Light pollution; GIS; visibility analysis; RS; DMSP data

Authors Robert M. Chapman

Year 1966 Chapman RM

Report Name Light wavelength and energy preferences of the bullfrog: Evidence for color vision

Publication Journal of Comparative and Physiological Psychology

Issue-page numbers Volume 61, Issue 3, June 1966, Pages 429-435

URL <http://www.sciencedirect.com/science/article/pii/S0021994007603760>

Abstract Bullfrogs' preferences for lights of various wavelengths and energies were studied in 4 experiments with a forced-choice, paired-comparisons procedure. Short wavelengths were preferred with lights of equal energy. The preference was heightened when lights of "equal brightness" were used, i.e., lights equated on the basis of bullfrogs' electroretinogram spectral sensitivity. With 460 and 540 millimicrons, but not with 620 millimicrons, higher energies were preferred among stimuli of different energies of the same wavelength. The preference for 460 millimicrons over 620 millimicrons could not be reversed by varying the energy of each over a 10,000-fold range. Frogs discriminate among wavelengths as well as among energies of light stimuli.

Keywords COLOR VISION, WAVELENGTH &; ENERGY LIGHT PREFERENCES, BULLFROG; ANIMALS, BULLFROG, WAVELENGTH &; ENERGY LIGHT PREFERENCES; SENSORY

Authors Charron, C.S., Cantliffe, D.J., Wheeler, R.M., Manukian, A., heath, R.R.

Year 1996 Charron CS, Cantliffe DJ, Wheeler RM, et al.

Report Name Photosynthetic photon flux, photoperiod and temperature effects on emissions of (Z)-3-hexenal, (Z)-3-hexenol and (Z)-3-hexenyl Acetate from Lettuce

Publication J. Amer. Soc. Hort. Sci.

Issue-page numbers 121, 488-494

URL N/A

Abstract N/A

Keywords

Authors Chaves I, Pokorny R, Byrdin M, Hoang N, Ritz T, Brettel K, Essen LO, van der Horst GT, Batschauer A, Ahmad M.

Year 2011 Chaves I, Pokorny R, Byrdin M, et al.

Report Name The cryptochromes: blue light photoreceptors in plants and animals.

Publication Annu Rev Plant Biol

Issue-page numbers Vol. 62: 335-364 (Volume publication date June 2011) DOI: 10.1146/annurev-arplant-042110-103759

URL <http://www.annualreviews.org/doi/abs/10.1146/annurev-arplant-042110-103759?journalCode=arplant>

Abstract Cryptochromes are flavoprotein photoreceptors first identified in *Arabidopsis thaliana*, where they play key roles in growth and development. Subsequently identified in prokaryotes, archaea, and many eukaryotes, cryptochromes function in the animal circadian clock and are proposed as magnetoreceptors in migratory birds. Cryptochromes are closely structurally related to photolyases, evolutionarily ancient flavoproteins that catalyze light-dependent DNA repair. Here, we review the structural, photochemical, and molecular properties of cry-DASH, plant, and animal cryptochromes in relation to biological signaling mechanisms and uncover common features that may contribute to better understanding the function of cryptochromes in diverse systems including in man.

Keywords

Authors Malcolm R. Clarke and P. L. Pascoe

Year 1985 Clarke MR, Pascoe PL

Report Name The influence of an electric light on the capture of deep-sea animals by a midwater trawl

Publication Journal of the Marine Biological Association of the United Kingdom

Issue-page numbers Volume 65, Issue 02, 373-393

URL <http://journals.cambridge.org/action/displayAbstract;jsessionid=69476E05296EA3CFE9D784FFFDE33B3E.journals?fromPage=online&aid=4391588>

Abstract For centuries man has used lights to attract and concentrate fishes near the sea surface to aid their capture by nets or hooks (Ben-Yami, 1982). Underwater lights lowered into shallow seas are now regularly used to lure fish into set nets, large nets suspended beneath ships or into the vicinity of powerful pumps (Sidelnicov, 1981; Andreev, 1962; Nikonov, 1969). Usually lights of more than 1 kw are used and such power requires a surface generator and strong insulated cable from the surface to the light. Although we know from these applications that some fish species are attracted by lights, the use of lights on trawls has not been developed for commercial exploitation or for research sampling. Perhaps such development has been discouraged by the safety problem and technical difficulties of providing electrical power on deck and handling heavily insulated conducting cable between the trawl and the generator. Lights have been used on commercial trawls with television in experiments to study fish reaction to trawls but such experiments were not concerned with finding the effect that lights might have on the quantity of fish caught and catches have not been analysed

Keywords

Authors M. R. Clarke, P. L. Pascoe and L. Maddock

Year 1986 Clarke MR, Pascoe PL, Maddock L

Report Name Influence of 70 Watt Electric Lights on the Capture of Fish By Otter Trawl Off Plymouth

Publication Journal of the Marine Biological Association of the United Kingdom

Issue-page numbers Volume 66, Issue 03, pp 711-720

URL <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=4376588>

Abstract The effect of two 70 W underwater electric lamps on the catch rate of a commercial bottom otter trawl was determined by comparative trials both at night and in daylight. It was found that, although the overall numbers and weights of fish caught did not differ, most of the species which were caught in large enough numbers for a judgement to be made showed a reaction to light. Three species, *Trachurus trachurus*, *Merlangius merlangus* and *Trisopterus minutus* were attracted and four species, *Eutrigla gurnardus*, *Micromesistius poutassou*, *Merluccius merluccius* and *Limanda limanda* were scared off by light.

The possible use of lights to further the development of selective commercial bottom trawling by attracting or scaring particular species is discussed.

Keywords

Authors Cochran, W.. W. and R. R. Graber

Year 1958 Cochran WW, Graber RR

Report Name Attraction of nocturnal migrants by lights on a television tower

Publication Wilson Bulletin

Issue-page numbers 70(4):378-380

URL <http://elibrary.unm.edu/sora/Wilson/v070n04/p0378-p0380.pdf>

Abstract N/A

Keywords

Authors Kathleen S. Cole, David L.G. Noakes
Year 1980 Cole KS, Noakes DLG
Report Name Development of early social behaviour of rainbow trout, *Salmo Gairdneri* (Pisces, Salmonidae)
Publication Behavioural Processes
Issue-page numbers Volume 5, Issue 2, June 1980, Pages 97-112
URL <http://www.sciencedirect.com/science/article/pii/0376635780900595>

Abstract Young rainbow trout do not begin agonistic behaviour until they are free-swimming. Agonistic behaviour initially consists mostly of simple, straightforward attacks. More complex threat patterns are added with increasing age. Increased water flow rate promotes station-holding and apparently territorial behaviour, especially at low fish densities. High fish densities lead to an increase in agonistic interactions, especially in fast flowing water. The interplay of these factors with the developmental processes of social behaviour is discussed.

Keywords

Authors Cole LJ
Year 1909 Cole LJ
Report Name LIGHTS ATTRACTING INSECTS
Publication Science
Issue-page numbers Jan 8;29(732):76.
URL <http://www.ncbi.nlm.nih.gov/pubmed/17782324>
Abstract N/A
Keywords N/A

Authors Kelvin F. Conrad, Martin S. Warren, Richard Fox, Mark S. Parsons, Ian P. Woiwod

Year 2006 Conrad KF, Warren MS, Fox R, et al.

Report Name Rapid declines of common, widespread British moths provide evidence of an insect biodiversity crisis

Publication Biological Conservation

Issue-page numbers Volume 132, Issue 3, October 2006, Pages 279-291

URL <http://www.sciencedirect.com/science/article/pii/S0006320706001777>

Abstract A fundamental problem in estimating biodiversity loss is that very little quantitative data are available for insects, which comprise more than two-thirds of terrestrial species. We present national population trends for a species-rich and ecologically diverse insect group: widespread and common macro-moths in Britain. Two-thirds of the 337 species studied have declined over the 35 yr study and 21% (71) of the species declined >30% 10 yr⁻¹. If IUCN (World Conservation Union) criteria are applied at the national scale, these 71 species would be regarded as threatened. The declines are at least as great as those recently reported for British butterflies and exceed those of British birds and vascular plants. These results have important and worrying implications for species such as insectivorous birds and bats, and suggests as-yet undetected declines may be widespread among temperate-zone insects.

Keywords Biodiversity; Population trends; Population dynamics; Abundance; Occupancy; Lepidoptera

Authors Craig R. Contor and J. S. Griffith

Year 1995 Contor CR, Griffith JS

Report Name Nocturnal emergence of juvenile rainbow trout from winter concealment relative to light intensity

Publication Hydrobiologia

Issue-page numbers Volume 299, Number 3, 179-183, DOI: 10.1007/BF00767324

URL <http://www.springerlink.com/content/r4p5u29262lgt15x/>

Abstract This study examined the relationship between light intensity and the number of juvenile rainbow trout (*Oncorhynchus mykiss*) visible to a snorkeler during February in the Henrys Fork of the Snake River, Idaho, USA. Fish were concealed in the substratum during daylight. Emergence from concealment was observed from 30 to 80 min after real sunset time and began when stars were first visible (pyranometric irradiance, $4.5 \times 10^{-3} \text{ W m}^{-2}$). Densities of visible fish were negatively correlated with light intensity ($r^2=0.81, P<0.001$). Later at night, densities decreased in the presence of moonlight and artificial light. Fish were observed to feed at night.

Keywords rainbow trout - *Oncorhynchus mykiss* - winter stream ecology - behaviour

Authors TIMOTHY Coppack, FRANCISCO Pulido

Year 2004 Coppack T, Pulido F

Report Name Photoperiodic Response and the Adaptability of Avian Life Cycles to Environmental Change

Publication Advances in Ecological Research

Issue-page numbers Volume 35, 2004, Pages 131-150

URL <http://www.sciencedirect.com/science/article/pii/S0065250404350075>

Abstract In birds, the annual change in daylength is the most important environmental cue used for synchronising breeding, moult, and migration with recurrent seasonal fluctuation in environmental conditions. Human-caused environmental changes may affect photo-responsive birds in two ways: (1) The photoperiod may become an unreliable predictor of favourable conditions if the phase relationship between temperature-dependent resource availability and daylength changes. For example, advances in the timing of breeding in response to increased spring temperature expose juvenile birds to altered photoperiodic conditions, which may result in unseasonably early autumn migration. (2) Range shifts and expansions may expose birds to novel photoperiodic conditions. Extant responses to these conditions could limit the potential of birds to evade increasingly unsuitable habitats and to establish new breeding and wintering...

Keywords

Authors Cornell, E. A. and J. P. Hailman

Year 1984 Cornell EA, Hailman JP

Report Name Pupillary responses of two *Rana pipiens*-complex anuran species

Publication Herpetologica

Issue-page numbers 40:356-366

URL <http://www.jstor.org/pss/3892087>

Abstract In what appears to be the first quantitative investigation of pupillary dynamics in anuran amphibians, *Rana pipiens* from Wisconsin and *Rana forreri* from Mexico were studied by infrared photography in 32 separate experiments. Dark-adapted pupils constricted slowly to light, reaching asymptotic closure after 10-20 min. At low illuminations (5-50 lux), the *pipiens* pupil may redilate fully after about 4 h in constant light. At higher illuminations (500-1500 lux), the pupil is still slowly redilating after 4 h, and at the highest illumination (5000 lux) fails to show signs of redilation even after 24 h. Responses of *R. forreri* are similar but the pupils never achieve full redilation at even the lowest illumination and show no clear signs of redilation at illuminations of 500 lux and higher. With increasing illumination, the speed and extent of maximum constriction both increase. After 24 h of light-adaptation, the pupil completely dilates to its normal opening within 1 h following light offset. Frogs immobilized by curare and physical restraint showed the same pupillary curves. Unlike the classical mammalian pupil, which constricts rapidly and then redilates to an asymptotic value depending upon the illumination, the slower anuran pupil either reaches the asymptote through initial constriction or (if the illumination is sufficiently low) redilates slowly showing no asymptote short of complete redilation within 4 h of light onset.

Keywords

Authors Catherine L Craig, Corey R Freeman

Year 1991 Craig CL, Freeman CR

Report Name Effects of predator visibility on prey encounter: a case study on aerial web weaving spiders

Publication Behavioral Ecology and Sociobiology

Issue-page numbers Volume: 29, Issue: 4, Pages: 249-254

URL <http://www.jstor.org/pss/4600615>

Abstract Perhaps the most important factor affecting predator-prey interactions is their encounter probability. Predators must either locate sites where prey are active or attract prey to them, and prey must be able to recognize potential predators and flee before capture. In this study we manipulate and describe three components of the foraging system of predatory, web-weaving spiders, the presence of viscid droplets, silk brightness (achromatic surface reflectance), and visibility of the orb pattern, to determine their effect on insect attraction, recognition, and web avoidance. We found that webs with viscid droplets were more visible to prey at close range, but at greater distances the sparkling droplets lured insects to the web area and hence increased insect capture probability. Although the size of viscid droplets and silk brightness are closely correlated (Table 2, Fig. 3), the relationships among droplet size, spider size, and the visual environments in which webs are found are more complicated (Fig. 2, Tables 2, 3). In environments with predictable light exposure, droplet size and hence silk visibility correlate with spider size, and spiders that forage at night produce relatively more visible silks than spiders that forage during the day (Table 3, Fig. 4). In habitats in which light levels are not predictable, silk surface reflectance and spider size are not closely correlated, suggesting that the complexity of the light environment, as well as the visual and foraging behaviors of insects found there, has played an important role in the evolution of spider-insect interactions.

Keywords

Authors O Croze, M Chanseau, M Larinier

Year 1999 Croze O, Chanseau M, Larinier M

Report Name Efficiency of a downstream bypass for Atlantic salmon (*Salmo salar* L.) smolts and fish behaviour at the Camon hydroelectric powerhouse water intake on the Garonne river

Publication Bulletin Francais De La Peche Et De La Pisciculture

Issue-page numbers Issue: 353-54, Pages: 121-140

URL <http://www.mendeley.com/research/efficiency-downstream-bypass-atlantic-salmon-salmo-salar-l-smolts-fish-behaviour-camon-hydroelectric-powerhouse-water-intake-garonne-riv>

Abstract Three experiments were conducted from 1996 to 1998 at the Camon hydroelectric powerhouse water intake, on the Garonne River, to test the efficiency of a surface downstream bypass for Atlantic salmon smolts. This bypass was built into the trashrack itself at its left edge. The efficiency of the device was evaluated using the mark-recapture method. Smolt behaviour in the intake canal was studied using radiotelemetry technique. In 1996, the bypass efficiency was low (34%). Radio-tracking showed that the bypass location was not responsible for its low efficiency, fish being listened most of the time in the vicinity of the bypass. Nevertheless, an unstable upwelling hid the device entrance. After installing submerged horizontal screen and plates upstream bypass entrance gate, the average efficiency increased to 73%. Good hydraulic conditions in the intake canal and good local hydrodynamic in the vicinity of the bypass entrance are essential to obtain a satisfactory downstream bypass efficiency. Intermittent nocturnal lighting has an effect on smolt behaviour in the intake canal by maintaining fish in directly lighted areas and on the rhythm of fish entry in the bypass, more fish being captured during the first part of the lighting off period. The catching of 7,715 wild salmonids has permitted to study downstream migration rhythms at dam. Daily downstream migration peaks seems to be linked with high water discharge and/or an increase of water temperature. Moreover, downstream migration activity at a dam appears to be mainly nocturnal.

Keywords

Authors Da Silva Nunes, V

Year 1988 Da Silva Nunes V

Report Name Vocalizations of treefrogs (*Smilisca sila*) in response to bat predation

Publication Herpetologica

Issue-page numbers 44:8-10

URL <http://www.jstor.org/pss/3892192>

Abstract The calling pattern of males of *Smilisca sila* was examined under conditions of natural ambient light at Barro Colorado Island, Panama, from January through April 1984. Males vocalized more frequently, used more complex calls, and were less likely to call from under leaves during "light" sampling periods than during "dark" sampling periods. Also, males vocalized significantly more frequently at dusk (between 1830 h and 1915 h) on moonless nights than on moonlit nights, although they did not use complex calls. The total calling period (between the first calling male and the last calling male on each night) was significantly longer for moonlit nights. This study suggests that this species of frog has developed a variety of behavior patterns that potentially reduce predation by bats.

Keywords

Authors Marie Dacke, Dan-Eric Nilsson, Clarke H. Scholtz, Marcus Byrne & Eric J. Warrant

Year 2003 Dacke M, Nilsson D, Scholtz CH, et al.

Report Name Animal behaviour: Insect orientation to polarized moonlight

Publication Nature

Issue-page numbers 424, 33 (3 July 2003) | doi:10.1038/424033a

URL <http://www.nature.com/nature/journal/v424/n6944/abs/424033a.html>

Abstract Moonlight, like sunlight¹, scatters when it strikes tiny particles in the atmosphere, giving rise to celestial polarization patterns². Here we show that an African dung beetle, *Scarabaeus zambesianus*, uses the polarization of a moonlit sky to orientate itself so that it can move along a straight line. Many creatures use the Sun's light-polarization pattern to orientate themselves^{3, 4}, but *S. zambesianus* is the first animal known to use the million-times dimmer polarization of moonlight for this purpose.

Keywords

Authors G. E. Dahl, S. Tao and I. M. Thompson

Year 2011 Dahl GE, Tao S, Thompson IM

Report Name Effects of photoperiod on mammary gland development and lactation

Publication J ANIM SCI

Issue-page numbers October 7, 2011 jas.2011-4630

URL <http://jas.fass.org/content/early/2011/10/07/jas.2011-4630.short>

Abstract Photoperiod, or the daily sequence of light and dark, has dramatic effects on many physiological systems across animal species. Light patterns alter melatonin secretion profiles and, subsequently, the release profiles and circulating concentrations of a number of hormones that influence a variety of physiological responses. Although the impact of photoperiod on reproductive processes is perhaps the most common example, it is often the seasonal aspects of ovulation and anestrus that are considered. However, in cattle, the final phase of reproduction, that is, lactation, is significantly influenced by photoperiod. In contrast to short days (SDPP; 8h light:16 h dark), exposure to long days (LDPP) of 16 to 18 h of light and 6 to 8 h of darkness increases milk yield 2 to 3 kg/d, regardless of the stage of lactation. There is evidence that this LDPP effect is due to increased circulating IGF-I, independent of any effect on GH concentrations. Cows that are housed under SDPP during the dry period have increased mammary growth and produce 3 to 4 kg/d more milk in the subsequent lactation compared with cows on LDPP when dry. While on SDPP, circulating prolactin (PRL) diminishes but expression of PRL receptor increases in mammary, liver, and immune cells. Moreover, PRL signaling pathways within those tissues are affected by photoperiod. Further, replacement of PRL to cows on SDPP partially reverses the effects of SDPP on production in the next lactation. Thus, effects on dry cows are mediated through a PRL-dependent pathway. Before maturity, LDPP improve mammary parenchymal accumulation and lean body growth, which lead to greater yields in the first lactation. The accumulated evidence supports the concept that photoperiod manipulation can be harnessed to improve the efficiency of production across the life cycle of the dairy cow.

Keywords insulin-like growth factor I, milk yield, photoperiod, prolactin

Authors Danthanarayana W and Dashper S

Year 1986 Danthanarayana W, Dashper S

Report Name Response of some nightflying insects to polarized light

Publication In: Danthanarayana W (Ed). Insect flight: dispersal and migration.

Issue-page numbers Berlin, Germany: Springer-Verlag

URL <http://onlinelibrary.wiley.com/doi/10.1002/mmnd.19880350124/abstract>

Abstract Book

Keywords

Authors Thomas W. Davies, Jonathan Bennie and Kevin J. Gaston

Year 2012 Davies TW, Bennie J, Gaston KJ

Report Name Street lighting changes the composition of invertebrate communities

Publication Biol. Lett.

Issue-page numbers Published online before print May 23, 2012, doi: 10.1098/rsbl.2012.0216

URL <http://rsbl.royalsocietypublishing.org/content/early/2012/05/15/rsbl.2012.0216.short>

Abstract Artificial lighting has been used to illuminate the nocturnal environment for centuries and continues to expand with urbanization and economic development. Yet, the potential ecological impact of the resultant light pollution has only recently emerged as a major cause for concern. While investigations have demonstrated that artificial lighting can influence organism behaviour, reproductive success and survivorship, none have addressed whether it is altering the composition of communities. We show, for the first time, that invertebrate community composition is affected by proximity to street lighting independently of the time of day. Five major invertebrate groups contributed to compositional differences, resulting in an increase in the number of predatory and scavenging individuals in brightly lit communities. Our results indicate that street lighting changes the environment at higher levels of biological organization than previously recognized, raising the potential that it can alter the structure and function of ecosystems.

Keywords artificial light pollution, community composition, ground-dwelling invertebrates, high pressure sodium, street lights

Authors Alistair Dawson, Verdun M. King, George E. Bentley, Gregory F. Ball

Year 2001 Dawson A, King VM, Bentley GE, Ball GF

Report Name Photoperiodic Control of Seasonality in Birds

Publication J Biol Rhythms

Issue-page numbers August 2001 vol. 16 no. 4 365-380

URL <http://jbr.sagepub.com/content/16/4/365.abstract>

Abstract This review examines how birds use the annual cycle in photoperiod to ensure that seasonal events—breeding, molt, and song production—happen at the appropriate time of year. Differences in breeding strategies between birds and mammals reflect basic differences in biology. Avian breeding seasons tend to be of shorter duration and more asymmetric with respect to changes in photoperiod. Breeding seasons can occur at the same time each year (predictable) or at different times (opportunistic), depending on the food resource. In all cases, there is evidence for involvement of photoperiodic control, nonphotoperiodic control, and endogenous circannual rhythmicity. In predictable breeders (most nontropical species), photoperiod is the predominant proximate factor. Increasing photoperiods of spring stimulate secretion of gonadotropin-releasing hormone (GnRH) and consequent gonadal maturation. However, breeding ends before the return of short photoperiods. This is the consequence of a second effect of long photoperiods—the induction of photorefractoriness. This dual role of long photoperiods is required to impart the asymmetry in breeding seasons. Typically, gonadal regression through photorefractoriness is associated with a massive decrease in hypothalamic GnRH, essentially a reversal to a pre-pubertal condition. Although breeding seasons are primarily determined by photoperiodic control of GnRH neurons, prolactin may be important in determining the exact timing of gonadal regression. In tropical and opportunistic breeders, endogenous circannual rhythmicity may be more important. In such species, the reproductive system remains in a state of “readiness to breed” for a large part of the year, with nonphotic cues acting as proximate cues to time breeding. Circannual rhythmicity may result from a temporal sequence of different physiological states rather than a molecular or cellular mechanism as in circadian rhythmicity. Avian homologues of mammalian clock genes *Per2*, *Per3*, *Clock*, *bmal1*, and *MOP4* have been cloned. At the molecular level, avian circadian clocks appear to function in a similar manner to those of mammals. Photoperiodic time measurement involves interaction between a circadian rhythm of photoinducibility and, unlike mammals, deep brain photoreceptors. The exact location of these remains unclear. Although the eyes and pineal generate a daily cycle in melatonin, this photoperiodic signal is not used to time seasonal breeding. Instead, photoperiodic responses appear to involve direct interaction between photoreceptors and GnRH neurons. Thyroid hormones are required in some way for this system to function. In addition to gonadal function, song production is also affected by photoperiod. Several of the nuclei involved in the song system show seasonal changes in volume, greater in spring than in the fall. The increase in volume is, in part, due to an increase in cell number as a result of neurogenesis. There is no seasonal change in the birth of neurons but rather in their survival. Testosterone and melatonin appear to work antagonistically in regulating volume.

Keywords

Authors M.J Delgado, P Gutiérrez, M Alonso-Bedat

Year 1983 Delgado MJ, Gutiérrez P, Alonso-Bedat M

Report Name Effects of daily melatonin injections on the photoperiodic gonadal response of the female frog *Rana ridibunda*

Publication Comparative Biochemistry and Physiology Part A: Physiology

Issue-page numbers Volume 76, Issue 2, 1983, Pages 389-392

URL <http://www.sciencedirect.com/science/article/pii/0300962983903432>

Abstract

#

1. □1. The effects of daily melatonin injections on female gonads in *Rana ridibunda* were examined.

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2. □2. Melatonin-treated *R. ridibunda* maintained on a long photoperiod (18L: 6D) had significantly smaller gonads than control animals. Thus, frogs injected daily with melatonin exhibited a substantial decrease in ovary weight when compared to saline-injected animals.

#

3. □3. Our findings suggest that melatonin exerts antigonadal effects in female *Rana ridibunda*.

Keywords

Authors Frauke Angelique Depauw, Alessandra Rogato, Maurizio Ribera d'Alcalá, Angela Falciatore

Year 2012 Depauw FA, Rogato A, d'Alcalá MR, Falciatore A

Report Name Exploring the molecular basis of responses to light in marine diatoms

Publication J. Exp. Bot.

Issue-page numbers doi: 10.1093/jxb/ers005 First published online: February 10, 2012

URL <http://jxb.oxfordjournals.org/content/early/2012/02/10/jxb.ers005.abstract>

Abstract

Light is an essential source of energy for life on Earth and is one of the most important signals that organisms use to obtain information from the surrounding environment, on land and in the oceans. Prominent marine microalgae, such as diatoms, display a suite of sophisticated responses (physiological, biochemical, and behavioural) to optimize their photosynthesis and growth under changing light conditions. However, the molecular mechanisms controlling diatom responses to light are still largely unknown. Recent progress in marine diatom genomics and genetics, combined with well-established (eco) physiological and biophysical approaches, now offers novel opportunities to address these issues. This review provides a description of the molecular components identified in diatom genomes that are involved in light perception and acclimation mechanisms. How the initial functional characterizations of specific light regulators provide the basis to investigate the conservation or diversification of light-mediated processes in diatoms is also discussed. Hypotheses on the role of the identified factors in determining the growth, distribution, and adaptation of diatoms in different marine environments are reported.

Keywords Diatoms, functional genomics, light acclimation and adaptation, photoreceptors

Authors Michael H. Depledge, Céline A.J. Godard-Codding, Robert E. Bowen

Year 2010 Depledge MH, Godard-Codding CAJ, Bowen RE

Report Name Light pollution in the sea

Publication Marine Pollution Bulletin

Issue-page numbers Volume 60, Issue 9, September 2010, Pages 1383-1385

URL <http://www.sciencedirect.com/science/article/pii/S0025326X10003528>

Abstract

- * 1. Sensitivity to light
- * 2. Light pollution
- * 3. Growing concerns regarding light pollution
- * 4. What can be done?
- * 5. Summary
- * Acknowledgements
- * References

Keywords

Authors Kim C Derrickson

Year 1988 Derrickson KC

Report Name Variation in repertoire presentation in northern mockingbirds

Publication The Condor

Issue-page numbers Volume: 90, Issue: 3, Pages: 592-606

URL <http://elibrary.unm.edu/sora/Condor/files/issues/v090n03/p0592-p0606.pdf>

Abstract

Male Northern Mockingbirds (*Mimus polyglottos*) have exceptionally large vocal repertoires. The manner of presenting this extensive repertoire, as described using five measures, varied with reproductive stage, among situations, and among individuals. All three versatility measures peaked during courtship declined significantly during incubation, and then slowly increased during nestling and fledgling stages. A fourth measure, bout length, increased as the season progressed, being shortest during courtship and longest during the fledgling stage. A final measure, recurrence interval (number of intervening bouts between two bouts of a particular song type) was shorter during the nestling and fledging stages than during courtship. Recurrence interval was shortest during patrolling and countersinging with neighboring males. Over 25% of the song types occurred only once in the sampling of singing behavior of four males each over 2 years. Mockingbirds sang these rare song types most commonly during prefemale and courtship stages, thereby increasing the recurrence interval and versatility during these stages. The pattern just described resulted in the greatest number of song types being sung per unit of time during courtship and provide circumstantial support for the hypothesis that song functions intersexually in mockingbirds. The ability to alter the manner of presentation may provide mockingbirds with the flexibility to emphasize particular functions at certain times and other functions at other times. Males with the highest versatility measures and lowest bout length tended to be the first to acquire mates and begin to nest. However, the importance of versatility in attracting females remains speculative and requires further experimental testing because these results were from only four males. Songs sung at night were presented in a manner most similar to the period before a female arrived on a male's territory. Interestingly, under natural lighting conditions, only unmated males sang extensively at night.

Keywords

Authors M. d'Istria, P. Monteleone, I. Serino, G. Chieffi

Year 1994 d'Istria M, Monteleone P, Serino I, Chieffi G

Report Name Seasonal Variations in the Daily Rhythm of Melatonin and NAT Activity in the Harderian Gland, Retina, Pineal Gland, and Serum of the Green Frog, *Rana esculenta*

Publication General and Comparative Endocrinology

Issue-page numbers Volume 96, Issue 1, October 1994, Pages 6-11

URL <http://www.sciencedirect.com/science/article/pii/S0016648084711531>

Abstract Day-night variations of melatonin content and N-acetyltransferase (NAT) activity were studied in the Harderian gland (HG), retina, pineal gland, and serum of the green frog *Rana esculenta*. Throughout the year the retinal melatonin content was correlated with retinal NAT activity and was always higher than those in the pineal gland and HG. On the other hand, in these structures diurnal fluctuations in NAT activity were observed. There were clear seasonal differences in the magnitude of the nocturnal increase of retinal melatonin levels as well as in the nocturnal pattern of retinal NAT activity. In summer day-night variations of melatonin and NAT are absent. The prevailing photoperiod seems to affect melatonin and NAT circadian rhythms in *R. esculenta*.

Keywords

Authors Kristian Donner, Simo Hemilä, Ari Koskelainen

Year 1998 Donner K, Hemilä S, Koskelainen A

Report Name Light adaptation of cone photoresponses studies at the photoreceptor and ganglion cell levels in the frog retina

Publication Vision Research

Issue-page numbers Volume 38, Issue 1, January 1998, Pages 19-36

URL <http://www.sciencedirect.com/science/article/pii/S0042698997001442>

Abstract The sensitivity and time scale of the dominant (562 nm) cone system of the frog, *Rana temporaria*, were studied as functions of steady adapting illuminance (IB). Photoreceptor responses to brief flashes of light were recorded as aspartate-isolated ERG mass potentials from the isolated retina. The characteristics of the cone signal after transmission through the retina were derived from response thresholds and stimulus-intensity-response-latency functions for extracellularly recorded spike discharges of single ganglion cells in the eyecup. At 14°C, the single-photon response of dark-adapted cones, extrapolated from ERG intensity-response functions, had an amplitude of 0.5% of the saturated response (U_{max}) and peaked at $t_p \approx 0.4$ sec. Steady background illumination decreased both t_p and flash sensitivity (SF), starting from apparent "dark lights" of, respectively, less than 10 (for time scale) and about 100 (for sensitivity) photoisomerisations per cone per second [$P \cdot \text{sec}^{-1}$]. From there upwards, two distinct ranges of background adaptation were apparent. Under moderate backgrounds (up to $IB \approx 104 - 105 P \cdot \text{sec}^{-1}$), sensitivity fell according to the relation $SF \propto IB^{-0.64}$ and time scale shortened according to $t_p \propto IB^{-0.16}$. Under brighter backgrounds, from approx. $105 P \cdot \text{sec}^{-1}$ up to the limit of our light source at $107 P \cdot \text{sec}^{-1}$, the decrease in SF was significantly stronger than predicted by the Weber relation ($SF \propto IB^{-1}$), while the decrease in t_p levelled out and even tended to reverse. All these changes were virtually identically at the photoreceptor and ganglion cell levels, although the absolute time scale of cone signals apparent at the latter level was 2-fold longer. Our general conclusion is that photoreceptors have several distinct regimes for light adaptation, and traditional descriptions of functional changes (in sensitivity and kinetics) relevant to vision need to be restated with higher resolution, in view also of recent insights into the diversity of underlying mechanisms.

Keywords Vision; Sensitivity; Time scale; Visual adaptation; Sensory latency; Phototransduction; Retinal transmission; ERG

Authors N.C. Downs, V. Beatona, J. Guest, J. Polanski, S.L. Robinson, P.A. Racey

Year 2003 Downs NC, Beatona V, Guest J, et al.

Report Name The effects of illuminating the roost entrance on the emergence behaviour of *Pipistrellus pygmaeus*

Publication Biological Conservation

Issue-page numbers Volume 111, Issue 2, June 2003, Pages 247-252

URL <http://www.sciencedirect.com/science/article/pii/S0006320702002987>

Abstract In an attempt to increase the accuracy of roost emergence counts for a monitoring programme, the exits of two *Pipistrellus pygmaeus* roosts were illuminated with light of different colours and intensities. Light intensity affected bat emergence more than light colour. At one roost there was no significant difference in the bat emergence pattern between when the roost exit received no illumination and when it was illuminated with red light. The use of the latter is proposed to increase the accuracy of bat roost emergence counts.

Keywords Pipistrelle, *Pipistrellus pygmaeus*; Light intensity; Light colour; Roost emergence; Bats

Authors Edwards, D.G.W.; El-Kassaby, Y.A

Year 1996 Edwards DGW, El-Kassaby YA

Report Name The effect of stratification and artificial light on the germination of mountain hemlock seeds

Publication Seed Science and Technology

Issue-page numbers 24: 225-235.

URL <http://cfs.nrcan.gc.ca/publications/?id=4627>

Abstract Germination in mountain hemlock, *Tsuga mertensiana* (Bong.) Carr., was investigated using 19 seed sources from British Columbia. Neither light nor stratification for 28 days had any significant effect on germination capacity, but light significantly ($p \leq 0.01$) reduced germination rate. Stratification significantly increased germination rate in all seed sources, although the amount of total variation attributable to this effect was small. Stratification did not overcome the effect of light, and it is recommended that seeds should be covered after sowing in the nursery. All sources, including one from the interior of the province, germinated relatively uniformly. No correlations could be found between germination parameters and age, source elevation and seed weight, but germination capacity and seed weight were correlated with latitude. No correlation existed between seed weight and elevation. For most sources, a test duration of 21 days was adequate for complete germination even of unstratified seeds. Mountain hemlock seeds should be stratified before being sown in the nursery, and they should be covered during the germination phase to exclude light.

Keywords Plants

Authors Eisuke Eguchi, Kiyoko Watanabe, Takahiko Hariyama, Kayoko Yamamoto

Year 1982 Eguchi E, Watanabe K, Hariyama T, Yamamoto K

Report Name A comparison of electrophysiologically determined spectral responses in 35 species of Lepidoptera

Publication Journal of Insect Physiology

Issue-page numbers Volume 28, Issue 8, 1982, Pages 675-682

URL <http://www.sciencedirect.com/science/article/pii/0022191082901457>

Abstract Spectral responses from the compound eyes of 35 lepidopteran species representing 14 families were investigated electrophysiologically using ERG recordings. The light-stimuli used covered the range of 383–700 nm wavelengths. All species show three or four maxima in their spectral sensitivity curves. Two of these peaks were usually associated with ultraviolet and blue light (383 and 460 nm, respectively). The other maxima occurred in the 500–620 nm region. In Nymphalidae the highest peak was found in response to 560–580 nm stimuli. Of all wavelengths tested, these are the longest wavelengths to produce principal peak sensitivities.

Pieridae and Lycaenidae have maxima in the UV region which represent significantly higher sensitivities than the secondary peaks to stimuli of longer wavelengths.

Satyridae, Danaidae, Hesperidae and diurnal moths except Epicopeia (Epicopeidae) generally have similar sensitivity curves with principal peaks between 500 and 520 nm.

In Papilionid species except Graphium (max = 560 nm) high maxima occur in the UV and blue (460 nm) region.

Nocturnal Sphingid moths possess the highest peak sensitivity at 540 nm. All other nocturnal moths tested have three or four maxima.

Keywords Spectral sensitivity; compound eye; ERG; Lepidoptera

Authors Lisa M. Einfalt, Edward J. Grace, David H. Wahl

Year 2012 Einfalt LM, Grace EJ, Wahl DH

Report Name Effects of simulated light intensity, habitat complexity and forage type on predator–prey interactions in walleye *Sander vitreus*

Publication Ecology of Freshwater Fish

Issue-page numbers Article first published online: 16 MAY 2012

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0633.2012.00576.x/abstract;jsessionid=F5BE91E22E51A6A5977BA38E991A8DC1.d01t01?systemMessage=Wiley+Online+Libr>

Abstract Predator-prey interactions can be influenced by the behaviour of individual species as well as environmental factors. We conducted laboratory experiments to test for the influences of two abiotic factors (light intensity and habitat complexity) on predator–prey interactions between walleye *Sander vitreus* and two prey species, bluegill *Lepomis macrochirus* and golden shiner *Notemigonus crysoleucas*. Three light intensities were simulated (day, twilight and night) in the presence or absence of simulated vegetation. Observations of predator behaviour indicated that walleye increased activity and foraging success with decreasing light levels and had most success capturing dispersed, closer prey. While schooling could not be maintained as light levels diminished, prey decreased predation vulnerability by moving into vegetation or higher in the water column. Throughout all treatments, bluegill were more evasive to capture as the number of strikes was similar on both prey but capture rates were higher for golden shiner. Although light intensity and simulated habitat complexity affected predator and prey behaviour, these factors did not interact to influence foraging success of walleye. To fully understand predator and prey behaviours in fishes, an understanding of species-specific responses to abiotic and biotic factors is necessary.

Keywords habitat;

Authors Gerhard Eisenbeis, Andreas Hänel

Year 2009 Eisenbeis G, Hänel A

Report Name Light pollution and the impact of artificial night lighting on insects

Publication Ecology of Cities and Towns (2009)

Issue-page numbers Issue: Sixma 2000, Publisher: Cambridge University Press, Pages: 1-20

URL <http://ebooks.cambridge.org/chapter.jsf?bid=CBO9780511609763&cid=CBO9780511609763A025>

Abstract Book

Keywords

Authors Eisenbeis, G. and F. Hassel

Year 2000 Eisenbeis G, Hassel F

Report Name [Attraction of nocturnal insects to street lights - a study of municipal lighting systems in a rural area of Rheinhessen (Germany.)]

Publication Natur und Landschaft

Issue-page numbers 75(4):145-156

URL N/A

Abstract Street lamps which illuminate public areas and places at night are of different types, emitting different spectra. All of them (e.g. white mercury (HME), orange sodium (HSE) or sodium-xenon vapour lamps (HSXT)) attract insects. During summer nights, myriads of insects fly restlessly around the lamps, which therefore have a marked impact on insect biology. There is some evidence that lamps differ with respect to their insect attraction. Sodium lamps, for instance, attract insects less strongly than white mercury lamps. We tested the attraction of three lamp types and, in addition, an ultraviolet absorber foil and some controls (lights without illumination). All installations were carried out by the electric utility of Rheinhessen/Germany (EWR) at three sites in a rural area. To trap insects, we used 19 air-elector traps which had been positioned within the light cones of the street lights. We caught a total of 44,210 insects (including some arachnids), distributed among 12 orders. Altogether the data set comprised 536 night trapping records. The results show that the number of insects captured at the three sites and the attraction per elector per day depends significantly on both the type of lamp and the site. By using sodium vapor street lamps (HSE), the number of insects caught was reduced significantly by more than 50%, and in the case of Lepidoptera by about 75%. We therefore recommend the use of sodium high pressure vapour lamps to improve the conservation of insect fauna. The results further show that there is a large potential to reduce costs for municipalities by switching street illumination from mercury vapour (HME) to sodium vapour (HSE) lamps.

Keywords

Authors Farida Emran, Jason Rihel, Alan R. Adolph, and John E. Dowling

Year 2010 Emran F, Rihel J, Adolph AR, Dowling JE

Report Name Zebrafish larvae lose vision at night

Publication Proc Natl Acad Sci U S A

Issue-page numbers 2010 March 30; 107(13): 6034–6039. doi: 10.1073/pnas.0914718107

URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2851871/>

Abstract Darkness serves as a stimulus for vertebrate photoreceptors; they are actively depolarized in the dark and hyperpolarize in the light. Here, we show that larval zebrafish essentially turn off their visual system at night when they are not active. Electroretinograms recorded from larval zebrafish show large differences between day and night; the responses are normal in amplitude throughout the day but are almost absent after several hours of darkness at night. Behavioral testing also shows that larval zebrafish become unresponsive to visual stimuli at night. This phenomenon is largely circadian driven as fish show similar dramatic changes in visual responsiveness when maintained in continuous darkness, although light exposure at night partially restores the responses. Visual responsiveness is decreased at night by at least two mechanisms: photoreceptor outer segment activity decreases and synaptic ribbons in cone pedicles disassemble.

Keywords photoreceptors, circadian rhythm, synaptic plasticity

Authors Fain, G. L

Year 1976 Fain GL

Report Name Sensitivity of toad rods: Dependence on wave-length and background illumination

Publication Journal of Physiology

Issue-page numbers 261:71-101

URL <http://jp.physoc.org/content/261/1/71>

Abstract 1. There are five morphological types of photoreceptors in the retina of the toad, *Bufo marinus*: red and green rods, single cones, and the principal and accessory members of double cones. The largest and most abundant of these is the red rod. 2. Intracellular recordings were used to investigate the dependence of the sensitivity of red rod responses on wave-length and background light. 3. The spectral sensitivity of dark-adapted and moderately light-adapted red rods can be satisfactorily fitted with the absorbance spectrum of the red rod photopigment. There are no significant contributions to red rod responses from cones or green rods. 4. In contrast, L-type horizontal cells, whose responses are dominated by input from the red rods near threshold, can be shown also to receive input from cones. 5. Steady background light produces a response in the red rods consisting of an initial hyperpolarization, followed by a decay of potential to a steady-state plateau level. The slow decay of response amplitude is accompanied by an increase in sensitivity to increment test flashes. 6. The increment sensitivity at steady-state decreases with increasing background intensity according to a modified Weber-Fechner relation. The dependence of increment sensitivity on the wave-length of the background light can be predicted by the red rod spectral sensitivity, showing that cones do not influence the light adaptation of rods. 7. At a background intensity of 11-5 log equivalent quanta cm⁻²sec⁻¹, sensitivity begins to deviate from the Weber-Fechner relation. In background light one log unit brighter, the rods are completely saturated. 8. Small responses having the spectral sensitivity of cones can be recorded from saturated rods. These potentials have a prominent off response whose wave form resembles the d-wave of the e.r.g. 9. A comparison of the increment-sensitivity curves of single receptors shows that rods are light-adapted by backgrounds one thousand times dimmer than those which affect cones. The increment-sensitivity curves of rods and cones cross, so that single cones become more sensitive than single rods even before the rods begin to saturate.

Keywords

Authors Francesca Fanelli, Markus Schmidt-Heydt, Miriam Haidukowski, Antonia Susca, Rolf Geisen, Antonio Logrieco, Giuseppina Mulè

Year 2011 Fanelli F, Schmidt-Heydt M, Haidukowski M, et al.

Report Name Influence of light on growth, conidiation and fumonisin production by *Fusarium verticillioides*

Publication Fungal Biology

Issue-page numbers In Press, Accepted Manuscript - Note to users doi:10.1016/j.funbio.2011.11.007

URL <http://www.sciencedirect.com/science/article/pii/S1878614611002315>

Abstract Light is a very important signal for fungi since it influences many different physiological responses. We analyzed the influence of light of varying wavelength and intensity on the growth, the conidiation and biosynthesis of fumonisin B1 (FB1), B2 (FB2) and B3 (FB3) by *Fusarium verticillioides* ITEM 10027. Wavelengths across the visible spectrum, from red (627 nm) to blue (470-455 nm), stimulated the growth and increased the fumonisin production, by up to 150% over dark incubation. If the intensity of the 455 nm blue light increased from 200 to 1700 Lux, the fumonisin biosynthesis decreased. Incubation under a short wave blue light (390 nm) showed reduced fungal growth and fumonisin production by up to 85%. White pulsing light had no effect on growth but reduced fumonisin production to half of what observed during dark incubation. Real time RT-PCR was used to measure the expression level of Fum1, Fum21 and FvVE1 transcripts, which encode proteins involved in fumonisin biosynthesis. There was a significant correlation between gene expression and fumonisin production.

Keywords Fumonisin; *Fusarium verticillioides*; Fum1; Fum21; FvVE1; Light

Authors Fedun, I

Year 1995 Fedun, I

Report Name Fatal Light Attraction

Publication Journal of Wildlife Rehabilitation

Issue-page numbers 18(3):10-11

URL N/A

Abstract N/A

Keywords

Authors V. Flari, M. Lazaridou-Dimitriadou

Year 1995 Flari V, Lazaridou-Dimitriadou M

Report Name The impact of nocturnal light pulses on the activity pattern of terrestrials snails (*Helix lucorum*) entrained to a photoperiod of 12 h light: 12 h dark

Publication Canadian Journal of Zoology

Issue-page numbers 73:(7) 1214-1220, 10.1139/z95-145

URL <http://www.nrcresearchpress.com/doi/abs/10.1139/z95-145>

Abstract The effects of nocturnal light pulses, "asymmetrical skeleton photoperiod regimes," on the circadian locomotor activity rhythm in adults of the edible snail *Helix lucorum* previously entrained to a photoperiod regime of 12□h light : 12□h dark were examined. In all experiments the snails showed a clear bimodal rhythm of behaviour, with peaks at both dusk and dawn. Shifts occurred according to the timing of 2-h light pulses applied in the scotophase and were related to the phase of snails' entrained rhythms. It is suggested that a minimum dark period (up to 10□h) is necessary for *H. lucorum* to retain its normal daily rhythmicity.

Keywords

Authors Fonken LK, Haim A, Nelson RJ

Year 2012 Fonken LK, Haim A, Nelson RJ

Report Name Dim light at night increases immune function in Nile grass rats, a diurnal rodent.

Publication Chronobiol Int

Issue-page numbers 2012 Feb;29(1):26-34.

URL <http://www.ncbi.nlm.nih.gov/pubmed/22217098>

Abstract With the widespread adoption of electrical lighting during the 20th century, human and nonhuman animals became exposed to high levels of light at night for the first time in evolutionary history. This divergence from the natural environment may have significant implications for certain ecological niches because of the important influence light exerts on the circadian system. For example, circadian disruption and nighttime light exposure are linked to changes in immune function. The majority of studies investigating the effects of light exposure and circadian disruption on the immune system use nocturnal rodents. In diurnal species, many hormones and immune parameters vary with secretion patterns 180° out of phase to those of nocturnal rodents. Thus, the authors investigated the effects of nighttime light exposure on immunocompetence in diurnal Nile grass rats (*Arvicanthis niloticus*). Rats were housed in either standard 14-h light (L):10-h dark (D) cycles with L □ 150 lux and D 0 lux or dim light at night (dLAN) cycles of LD 14:10 with L □ 150 lux and D 5 lux for 3 wks, then tested for plasma bactericidal capacity, as well as humoral and cell-mediated immune responses. Rats exposed to dLAN showed increased delayed-type hypersensitivity pinna swelling, which is consistent with enhanced cell-mediated immune function. dLAN rats similarly showed increased antibody production following inoculation with keyhole lymphocyte hemocyanin (KLH) and increased bactericidal capacity. Daytime corticosterone concentrations were elevated in grass rats exposed to nighttime dim light, which may have influenced immunological measures. Overall, these results indicate nighttime light affects immune parameters in a diurnal rodent.

Keywords

Authors	Rémi Fontaine, Olivier Gimenez, Joël Bried
Year	2011 Fontaine R, Gimenez O, Bried J
Report Name	The impact of introduced predators, light-induced mortality of fledglings and poaching on the dynamics of the Cory's shearwater (<i>Calonectris diomedea</i>) population from the Azor
Publication	Biological Conservation
Issue-page numbers	Volume 144, Issue 7, July 2011, Pages 1998-2011
URL	http://www.sciencedirect.com/science/article/pii/S0006320711001625
Abstract	<p>Cory's shearwater (<i>Calonectris diomedea</i>) is a procellariiform seabird which breeds in the Mediterranean and the north-eastern subtropical Atlantic, and which is considered "Vulnerable" in Europe due to recent declines at some localities. In the Azores archipelago (Atlantic), the introduction of mammalian predators by man has led to petrels being extirpated from the main islands, except for Cory's shearwater. Currently, the Azorean population of Cory's shearwaters represents 65% of the species' world population. However, its dynamics remains unknown, although: (1) numbers might have declined by 43% between 1996 and 2001, (2) on the main islands, the young suffer mortality from introduced mammals, poachers, and urban lights upon fledging, and (3) at sea, the level of fishery mortality remains unknown.</p> <p>To fill this gap, we conducted a 7-year demographic survey on a mammal-free islet in the Azores to determine adult survival rate using capture-mark-recapture of the breeders and to estimate fecundity. We also assessed urban mortality using the data from the rescue campaigns annually conducted in the archipelago. Urban mortality concerned about 6% of fledglings, but its importance greatly varied among islands. When rescue campaigns occur, the rate might drop below 0.5%. Overall, our simulations concerning the next 100 years do not allow excluding a decrease in Cory's shearwater numbers in the Azores without rescue campaigns (by 87% under the least favourable scenario). Rescue campaigns should only slow down the decline unless, simultaneously, lower competition for nests compared to Vila islet allows adults to breed almost every year on the main islands and juvenile survival exceeds a threshold value. Since adult survival rate was high (>0.93), an eventual decline of the Azorean population of Cory's shearwaters would probably not result from fishery mortality of adults, but rather from poor fledgling productivity and perhaps also from low survival during the first year at sea.</p>
Keywords	Procellariiformes; Population dynamics; Light-induced mortality; Azores; <i>Calonectris diomedea</i>

Authors RICHARD FOX

Year 2012 Fox R

Report Name The decline of moths in Great Britain: a review of possible causes

Publication Insect Conservation and Diversity

Issue-page numbers Article first published online: 20 JAN 2012

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-4598.2012.00186.x/full>

Abstract

1. □ Population declines among insects are inadequately quantified, yet of vital importance to national and global biodiversity assessments and have significant implications for ecosystem services.
2. □ Substantial declines in abundance and distribution have been reported recently within a species-rich insect taxon, macro-moths, in Great Britain and other European countries. These declines are of concern because moths are important primary consumers and prey items for a wide range of other taxa, as well as contributing to ecosystem services such as pollination.
3. □ I summarise these declines and review potential drivers of change. Direct evidence for causes of moth declines is extremely limited, but correlative studies and extrapolation from closely related taxa suggest that habitat degradation (particularly because of agricultural intensification and changing silviculture) and climate change are likely to be major drivers. There is currently little evidence of negative population-level effects on moths caused by chemical or light pollution, non-native species or direct exploitation.
4. □ I make suggestions for future research with a focus on quantifying impacts of land management practices, light pollution and climate change on moth population dynamics and developing evidence-based measures that can be incorporated into agri-environment schemes and other policy initiatives to help reverse the widespread decline of moths in Great Britain and beyond.

Keywords

Authors Frank, K.

Year 1991 Frank K

Report Name Outdoor lighting effect on Moths

Publication Light Pollution, Radio Interference, and Space Debris, ASP Conference Series

Issue-page numbers ol. 17, IAU Colloquium 112, 1991, D.L. Crawford, Ed., p. 51.

URL <http://articles.adsabs.harvard.edu/full/1991ASPC...17...51F>

Abstract

Outdoor lighting incapacitates and destroys some moths. It disturbs flight, navigation, vision, migration, dispersal, oviposition, mating, feeding, and crypsis. It may also shift circadian rhythms. Lamps may incinerate or desiccate moths, or lead to moth's destruction by birds, bats, spider, and vehicular traffic. Conservation efforts need to consider disruptive ecological effects of outdoor lighting. Low pressure sodium lamps may reduce these effects.

Keywords

Authors Kenneth D Frank

Year 2009 Frank KD

Report Name Exploitation of artificial light at night by a diurnal jumping spider

Publication Journal of Arachnology (2009)

Issue-page numbers

URL <http://www.mendeley.com/research/exploitation-artificial-light-night-diurnal-jumping-spider-1/>

Abstract

Keywords

Authors Frank, K. D.

Year 1988 Frank KD

Report Name Impact of outdoor lighting on moths: An assessment

Publication Journal of the Lepidopterists' Society

Issue-page numbers 42(2):63-93

URL <http://peabody.research.yale.edu/jls/pdfs/1980s/1988/1988-42%282%2963-Frank.pdf>

Abstract Outdoor lighting has sharply increased over the last four decades. Lepidopterists have blamed it for causing declines in populations of moths. How outdoor lighting affects moths, however, has never been comprehensively assessed. The current study makes such an assessment on the basis of published literature. Outdoor lighting disturbs flight, navigation, vision, migration, dispersal, oviposition, mating, feeding and crypsis in some moths. In addition it may disturb circadian rhythms and photoperiodism. It exposes moths to increased predation by birds, bats, spiders, and other predators. However, destruction of vast numbers of moths in light traps has not eradicated moth populations. Diverse species of moths have been found in illuminated urban environments, and extinctions due to electric lighting have not been documented. Outdoor lighting does not appear to affect flight or other activities of many moths, and counterbalancing ecological forces may reduce or negate those disturbances which do occur. Despite these observations outdoor lighting may influence some populations of moths. The result may be evolutionary modification of moth behavior, or disruption or elimination of moth populations. The impact of lighting may increase in the future as outdoor lighting expands into new areas and illuminates moth populations threatened by other disturbances. Reducing exposure to lighting may help protect moths in small, endangered habitats. Low-pressure sodium lamps are less likely than are other lamps to elicit flight-to-light behavior, and to shift circadian rhythms. They may be used to reduce adverse effects of lighting.

Keywords

Authors	Fratlicelli F., Palella A.
Year	1995 Fraticelli F, Palella A
Report Name	Dossier WWF: Svelare la notte, ovvero la riduzione dell'inquinamento luminoso (in italian)
Publication	World Wildlife Fund
Issue-page numbers	Italia, November 1995, D31.
URL	http://cielobuio.org/index.php?option=com_docman&task=doc_details&gid=124&Itemid=54

Abstract

... "And then we went to see the stars." When, at the beginning of the fourteenth century, our great poet wrote these verses, was normal, raising his eyes to the sky during the night, watching the glitter of a myriad of stars. If we were to now turn our attention to the time at night with difficulty I could see some celestial body. The artificial light sources in the cities, villages, streets, cars cause such a glow to obscure the sources of natural light. We now even have to send our astronomical observatories in orbit, not only to overcome the filter of the atmosphere, but also to clear the barrier of light.

However, are not only our eyes that scan the sky, a myriad of living organisms use natural light sources as a means of orientation. The inability to observe or super-stimuli produced by artificial light sources cause profound changes in their behavior that in many cases have a direct impact on their chances of survival.

The artificial light pollution is a physical and cultural pollution that affects humans, fauna and flora.

Reduce and rationalize the system of artificial lighting is to reverse the trends, perhaps the most crude and unconscious of Western society, and environmental monitoring.

Unveiling the night from the flat blanket of luminescence is therefore the objective ecological and cultural WWF has been imposed.

Keywords

Authors Frey, J. K.

Year 1993 Frey JK

Report Name Nocturnal foraging by Scissor-Tailed Flycatchers under artificial light

Publication Western Birds

Issue-page numbers 24(3):200

URL N/A

Abstract I observed nocturnal foraging by Scissor-tailed flycatcher (*Myiarchus cinerascens*) on 27 April 1992 at College Station, Brazos County, Texas. Sunset was at 20:01 central daylight time. At approximately 21:30 I saw an adult Scissor-tailed flycatcher perched on a utility wire below a street light adjacent to a busy four-lane highway. A second Scissor-tailed flycatcher arrived at approximately 22:00. It perched on the utility wire about 1 m from the first bird. Both flycatchers hunted flying insects attracted to, or illuminated by, the street light. The flycatchers were not observed to chase insects beyond the lighted area. After pursuing an insect the birds returned immediately to their perch. Insects present that the birds were preying on were not identified but included several others. The two birds continued foraging until at least 23:00 when I discontinued my observation.

Keywords

Authors Fritzsche, R.A., R.H. Chamberlain, and R.A. Fisher

Year 1985 Fritzsche RA, Chamberlain RH, Fisher RA

Report Name Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) -- California grunion

Publication U.S. Fish Wildl. Serv. Biol. Rep.

Issue-page numbers 82(11.28) U.S. Army Corps of Engineers, TR L-82-4. 12 pp.

URL http://www.nwrc.usgs.gov/wdb/pub/species_profiles/82_11-028.pdf

Abstract Exposure to light seems to reduce hatching success of grunion eggs (Hubbs 1965). Young grunion are positively phototactic and can be attracted to light as bright as 10,000 lux (Reynolds et al. 1977). The strength of the gathering response is apparently related to the strength of the light stimulus.

Keywords

Authors	Fure, A
Year	2006 Fure A
Report Name	Bats and Lighting
Publication	The London Naturalist
Issue-page numbers	No. 85
URL	http://www.furesfen.co.uk/bats_and_lighting.pdf

Abstract This report summarises studies on bat vision; discusses the function of rods in the bat retina; looks at the sensitivity of bat rods to visible light, their greater tolerance of red visible light, their sensitivity to ultraviolet light; and explores the differences which exist across the species range. It discusses artificial light, including torchlight, security and floodlighting, as reviews regional and national studies undertaken, mainly by Bat Group members. It tabulates surveys specifically undertaken to inform planning applications for floodlighting in London under the Habitats Regulations 1994 and Planning Guidance PPS9. It looks at types of mitigation that have been used in areas frequented by bats. In short, it summarises what we already know, have known for a long time, questions recent departures from good practice, and appeals for a common - sense approach for the future.

Keywords

Authors	Angeliki Galeou, Anastasia Prombona
Year	2011 Galeou A, Prombona A
Report Name	Light at night resynchronizes the evening-phased rhythms of TOC1 and ELF4 in <i>Phaseolus vulgaris</i>
Publication	Plant Science
Issue-page numbers	http://dx.doi.org/10.1016/j.plantsci.2011.12.014 ,
URL	http://www.sciencedirect.com/science/article/pii/S0168945211003669

Abstract Circadian clocks regulate the adaptation of the organisms' physiology to the environmental light-dark cycles. Photoc resetting of the clock differs among plant species. In *Arabidopsis thaliana*, morning-phased genes are not responsive to light signals at night, while in *Phaseolus vulgaris*, morning-phased genes are responsive to light at trough phases that are reached during the night. In order to explore this further, in this work we investigated the light-responsiveness at night of two *P. vulgaris* evening phased genes, the orthologs of TOC1 and ELF4. Our results demonstrate that the oscillation of their expression is symphasic under all applied photic conditions. Thus, under photoperiod peak phases are obtained in the evening (LD 12:12) or early at night (LD 6:18). Light application at the beginning of the night under LD 6:18 results in a phase shift of the PvTOC1 and PvELF4 oscillation, while at the end of the night the phase remains unchanged. Moreover, when light is applied at the narrow time window of the peak phase, a significant transient increase in the expression of both PvTOC1 and PvELF4 is caused. These results indicate that, depending on the plant species, evening-phased genes may also participate in the resetting of the circadian clock machinery by light.

Keywords

Authors Terrel Gallaway

Year 2010 Gallaway T

Report Name On Light Pollution, Passive Pleasures, and the Instrumental Value of Beauty

Publication Journal of Economic Issues

Issue-page numbers Volume 44, Number 1 / March 2010

URL <http://mesharpe.metapress.com/openurl.asp?genre=article&issn=0021-3624&volume=44&issue=1&spage=71>

Abstract The night sky is a unique and exquisitely valuable cultural asset that is being lost to humanity. Light pollution obscures the heavens, interferes with wildlife, and wastes billions of dollars in energy annually. Light pollution can be easily mitigated, but unfortunately, it has gone largely unnoticed as a preventable environmental problem. This paper examines light pollution as well as the value of the night sky. The paper focuses on society's disregard for the loss of a cultural asset that has been a part of art, science, and culture for as long as these things have existed. It argues that the blame lies largely in an inability to articulate adequately the value of natural beauty. It is further argued that such beauty has instrumental value, and the explicit recognition of this value is an important step toward preserving the night sky and other objects of natural beauty.

Keywords light pollution, passive pleasures, instrumental value theory, night sky, scenic stock

Authors Terrel Gallaway , Reed N. Olsen, David M. Mitchell

Year 2010 Gallaway T, Olsen RN, Mitchell DM

Report Name The economics of global light pollution

Publication Ecological Economics

Issue-page numbers Volume 69, Issue 3, 15 January 2010, Pages 658-665

URL <http://www.sciencedirect.com/science/article/pii/S0921800909004121>

Abstract This paper is the first analysis of the economic factors of global light pollution. Light pollution commonly refers to excessive or obtrusive artificial light caused by bad lighting design. Light pollution generates significant costs including negative impacts on wildlife, health, astronomy, and wasted energy—which in the U.S. amounts to nearly 7 billion dollars annually. Current scientific models of light pollution are purely population based. The current paper utilizes unique remote sensing data and economic data from the World Bank to quantify the economic causes of light pollution globally. Fractional logit models show that, similar to other types of pollution, both population and GDP are significant explanatory variables.

Keywords

Authors Gancedo B, Alonso-Gómez AL, de Pedro N, Delgado MJ, Alonso-Bedate M.

Year 1996 Gancedo B, Alonso-Gómez AL, de Pedro N, Delgado MJ, Alonso-Bedate M.

Report Name Daily changes in thyroid activity in the frog *Rana perezi*: variation with season

Publication Comp Biochem Physiol C Pharmacol Toxicol Endocrinol.

Issue-page numbers May;114(1):79-87.

URL <http://www.ncbi.nlm.nih.gov/pubmed/8689532>

Abstract Plasma triiodothyronine (T3) and thyroxine (T4) levels, as well as thyroid free (f) and bound (b) thyroid hormones (TH) content, were determined by radioimmunoassay (RIA) in adult *Rana perezi* frogs during a 24 h cycle in winter, spring, summer, and autumn. Significant daily changes in plasma T3 levels were present in all the seasons except for winter, being the lowest values observed during the scotophase. In contrast, plasma T4 only showed significant changes in spring, following a similar pattern to the one described for T3. Thyroid fT3 content did present day/night significant changes only in spring showing high contents at early scotophase. Mean fT4 content was higher at the beginning of light phase than during the rest of daily photocycle in spring and autumn, but significant differences appeared only in autumn. Regarding the thyroid bound content of TH, bT3, and bT4 presented significant daily changes in spring and autumn. However, different profiles were observed in these two seasons. High bound contents were found at early photo- and scotophase with lower values at late dark phase in spring, whereas higher contents were detected at this time in autumn. The present results indicate the existence of seasonally changing daily fluctuations in thyroid activity in *Rana perezi* and it seems that an interaction between photoperiod and temperature plays a role in the regulation of these daily changes.

Keywords

Authors Alejandra García-López, Estefanía Micó, Manuel A. Zumbado, and Eduardo Galante

Year 0 García-López A, Micó E, Zumbado MA, Galante E

Report Name Sampling scarab beetles in tropical forests: The effect of light source and night sampling periods

Publication Journal of Insect Science

Issue-page numbers Vol. 11 | Article 95

URL <http://www.insectscience.org/11.95/i1536-2442-11-95.pdf>

Abstract Light traps have been used widely to sample insect abundance and diversity, but their performance for sampling scarab beetles in tropical forests based on light source type and sampling hours throughout the night has not been evaluated. The efficiency of mercury-vapour lamps, cool white light and ultraviolet light sources in attracting Dynastinae, Melolonthinae and Rutelinae scarab beetles, and the most adequate period of the night to carry out the sampling was tested in different forest areas of Costa Rica. Our results showed that light source wavelengths and hours of sampling influenced scarab beetle catches. No significant differences were observed in trap performance between the ultraviolet light and mercury-vapour traps, whereas these two methods caught significantly more species richness and abundance than cool white light traps. Species composition also varied between methods. Large differences appear between catches in the sampling period, with the first five hours of the night being more effective than the last five hours. Because of their high efficiency and logistic advantages, we recommend ultraviolet light traps deployed during the first hours of the night as the best sampling method for biodiversity studies of those scarab beetles in tropical forests.

Keywords

Authors Sidney A. Gauthreaux, Jr.
Year 1972 Gauthreaux SA
Report Name Behavioral responses of migrating birds to daylight and darkness: a radar and direct visual study
Publication The Wilson Bulletin
Issue-page numbers Vol. 84, No. 2 (Jun., 1972), pp. 136-148
URL <http://www.jstor.org/pss/4160190>

Abstract I studied the behavior of migrating birds aloft by means of telescopic and binocular observations during the day (open sky overhead) and at night (ceillometer and moon-watching) and with WSR-57 radars in southern Louisiana. Spring passerine migrations across the Gulf of Mexico usually arrived on the northern Gulf coast during the daylight hours, and most of the birds were in tight flocks that averaged about 20 birds. On radar the flocks produced coherent dot echoes, and most occurred at an altitude of 4,000 to 5,000 feet (1,220 to 1,524 meters). When landing the migrants dove nearly straight down from these altitudes and produced a whizzing sound as they pulled out of the dive just above the trees. The daytime flocks of passerines disbanded about 30 to 45 minutes after sunset, and the altitude of the migration lowered approximately 3,000 feet (915 meters). At night individual passerines produced fine, dust-like echoes on the radar screen while flocks of waterfowl and shorebirds contributed the scattered dot echoes. Most nocturnal migration occurred between 800 and 1,600 feet (244 to 488 meters). Flight calls from migrants were heard during the day when the birds were landing. Passerine calling at the beginning of the night was primarily associated with landing and overcast. Waterfowl and shorebirds called regularly during the first part of the night even under clear skies. Calling by migrants aloft probably serves to keep individuals of a flock together and functions in the landing of songbird migrants at night.

Keywords

Authors Gauthreaux, S.A. Jr., Belser, C.G.
Year 1999 Gauthreaux SA, Belser CG
Report Name The behavioral responses of migrating birds to different lighting systems on tall towers
Publication Proc. Workshop on Avian Mortality at Communications Towers
Issue-page numbers 119th meeting of the American Ornithologists' Union, Cornell University, August 11th, 1999
URL N/A
Abstract N/A

Keywords

Authors Elizabeth A. Gerson, Rick G. Kelsey

Year 1997 Gerson EA, Kelsey RG

Report Name Attraction and direct mortality of pandora moths, *Coloradia pandora* (Lepidoptera: Saturniidae), by nocturnal fire

Publication Forest Ecology and Management

Issue-page numbers Volume 98, Issue 1, 22 October 1997, Pages 71-75

URL <http://www.sciencedirect.com/science/article/pii/S0378112797000881>

Abstract The attraction of nocturnal moths to candles and other sources of light has long been observed, but fire as a potential source of mortality to moths in ecosystems with frequent fire regimes has been overlooked. A prescribed burn was conducted shortly after dark in a central Oregon ponderosa pine forest during the flight period of the endemic defoliator *Coloradia pandora* (Blake). Attraction to the fire and partial consumption by flames caused direct mortality estimated at 2.2% to 17.1% of the local pandora moth population. In field tests with projected light, pandora moths did not discriminate among colors in the visible spectrum. Moths did not respond to projected light for at least 1 h after dusk, indicating that timing and duration of the prescribed fire may have limited the mortality.

Keywords Fire-insect interactions; Phototaxis; Ponderosa pine

Authors Gladgelter, H. L.

Year 1966 Gladgelter HL

Report Name Nocturnal behavior of White-tailed Deer in the Hatter Creek Enclosure

Publication M.S. thesis, University of Idaho

Issue-page numbers 3p. WR 231. Project Number: Idaho Cooperative Wildlife Research; IDA. W-085-R-17/JOB 09-PT 1.

URL

Abstract

Keywords

Authors Edna González-Bernal, Gregory P. Brown, Elisa Cabrera-Guzmán and Richard Shine

Year 2011 González-Bernal E, Brown GP, Cabrera-Guzmán E, Shine R

Report Name Foraging tactics of an ambush predator: the effects of substrate attributes on prey availability and predator feeding success

Publication Behavioral Ecology and Sociobiology

Issue-page numbers Volume 65, Number 7, 1367-1375, DOI: 10.1007/s00265-011-1147-9

URL <http://www.springerlink.com/content/m503qh5176831682/>

Abstract The foraging sites selected by an ambush forager can strongly affect its feeding opportunities. Foraging cane toads (*Rhinella marina*) typically select open areas, often under artificial lights that attract insects. We conducted experimental trials in the field, using rubber mats placed under lights, to explore the influence of substrate color and rugosity on prey availability (numbers, sizes, and types of insects) and toad foraging success. A mat's color (black vs. white) and rugosity (smooth vs. rough) did not influence the numbers, sizes, or kinds of insects that were attracted to it, but toads actively preferred to feed on rugose white mats (50% of prey-capture events, vs. a null of 25%). White backgrounds provided better visual contrast of the (mostly dark) insects, and manipulations of prey color in the laboratory showed that contrast was critical in toad foraging success. Insects landing on rugose backgrounds were slower to leave, again increasing capture opportunities for toads. Thus, cane toads actively select backgrounds that maximize prey-capture opportunities, a bias driven by the ways that substrate attributes influence ease of prey detection and capture rather than by absolute prey densities.

Keywords Foraging success – Prey choice – Prey selection – *Bufo marinus* – Sit-and-wait predation

Authors W. Paul Gorenzel and Terrell P. Salmon

Year 1995 Gorenzel WP, Salmon TP

Report Name Characteristics of American Crow urban roosts in California

Publication The Journal of Wildlife Management

Issue-page numbers Vol. 59, No. 4 (Oct., 1995), pp. 638-645

URL <http://www.jstor.org/pss/3801939>

Abstract American crows (*Corvus brachyrhynchos*) roost in urban areas across the United States creating problems resulting from fecal droppings, noise, and health hazards. With little information about roosts, managers have been unable to respond to questions from the public about roost problems or design control programs. We counted crows flying into Woodland, California, to roost, surveyed roosts for occupancy, and recorded features of 87 roost trees and 62 randomly selected nonroost trees from August 1992 through July 1994. Some crows roosted in town all year, with peak abundance from September through January. Roost trees had greater height, diameter at breast height (dbh), and crown diameter and volume than nonroost trees ($P < 0.001$ all cases). Most roost trees were located over an asphalt or concrete substrate ($P < 0.001$) in commercial areas of the city, rather than in residential areas ($P < 0.001$), and were subjected to greater disturbance from vehicles and people ($P < 0.01$). Ambient light levels and interior canopy temperatures during winter were greater at roost trees than nonroost trees ($P < 0.001$ both cases). There were seasonal changes in roost trees selected with an increased ($P < 0.001$) use of deciduous trees (elms [*Ulmus* spp.], mulberries [*Morus* spp.], oaks [*Quercus* spp.], and ashes [*Fraxinus* spp.]) in residential areas during summer months as opposed to the concentrated use of evergreen oaks, alders (*Alnus* spp.), and conifers (*Pinus* spp. and *Sequoia* spp.) in commercial areas during winter. We developed a logistic regression model with 4 variables that correctly classified status of 85% of roost or nonroost trees.

Keywords

Authors Karl Gotthard

Year 2000 Gotthard K

Report Name <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2656.2000.00432.x/abstract>

Publication Journal of Animal Ecology

Issue-page numbers Volume 69, Issue 5, pages 896–902, September 2000

URL <http://onlinelibrary.wiley.com/doi/10.1046/j.1365-2656.2000.00432.x/abstract>

Abstract

1. Life history theoreticians have traditionally assumed that juvenile growth rates are maximized and that variation in this trait is due to the quality of the environment. In contrast to this assumption there is a large body of evidence showing that juvenile growth rates may vary adaptively both within and between populations. This adaptive variation implies that high growth rates may be associated with costs.
2. Here, I explicitly evaluate the often-proposed trade-off between growth rate and predation risk, in a study of the temperate butterfly, *Pararge aegeria* (L).
3. By rearing larvae with a common genetic background in different photoperiods it was possible to experimentally manipulate larval growth rates, which vary in response to photoperiod. Predation risk was assessed by exposing larvae that were freely moving on their host plants to the predatory heteropteran, *Picromerus bidens* (L.).
4. The rate of predation was significantly higher in the fast-growing larvae. An approximately four times higher relative growth rate was associated with a 30% higher daily predation risk.
5. The main result demonstrates a trade-off between growth rate and predation risk, and there are reasons to believe that this trade-off is of general significance in free-living animals. The results also suggest that juvenile development of *P. aegeria* is governed by a strategic decision process within individuals.

Keywords age and size at maturity; growth strategy; life history theory; predation risk; trade-off

Authors Govardovskii VI, Zueva LV.

Year 1974 Govardovskii VI, Zueva LV.

Report Name Spectral sensitivity of the frog eye in the ultraviolet and the visible region

Publication Vision Res

Issue-page numbers Dec;14(12):1317-21.

URL <http://www.ncbi.nlm.nih.gov/pubmed/4548592>

Abstract N/A

Keywords

Authors Richard R. Graber

Year 1968 Graber RR

Report Name Nocturnal Migration in Illinois: Different Points of View

Publication The Wilson Bulletin

Issue-page numbers Vol. 80, No. 1 (Mar., 1968), pp. 36-71

URL <http://www.jstor.org/pss/4159682>

Abstract N/A

Keywords

Authors Allen M. Granda, Charles E. Stirling

Year 1966 Granda AM, Stirling CE

Report Name The spectral sensitivity of the turtle's eye to very dim lights

Publication Vision Research

Issue-page numbers Volume 6, Issues 3-4, April 1966, Pages 143-152

URL <http://www.sciencedirect.com/science/article/pii/0042698966900368>

Abstract Spectral sensitivity curves derived from electroretinograms in the turtle's eye have shown characteristic peaks near 640 nm and 575 nm, with a very sharp fall-off in sensitivity toward the shorter wavelengths. During simultaneous recording from the optic tectum, however, a blue-green process near 530 nm is present at low levels of previous term
lightnext term which is not evident in the peripheral record from the eye. In an attempt to assess the spectral sensitivity of this eye to very previous term
dimnext term previous term levels, a high-speed digital computer was used to detect the very small responses hidden in noise. The method averaged synchronized responses over a given number of times to repetitive previous term
light flashes. The wave-forms so derived show the same kind of ripples characteristic of responses obtained at more intense levels of previous term
light. A plot of wave-form peak-to-peak amplitude versus log stimulus intensity shows essentially a linear relationship over a one and a half log unit range. Spectral curves based on low constant criteria of response show rather wide differences between subjects, but in general, indicate a broad, blue-green process as well as yellow and deep-red processes.

Keywords

Authors GRANDREAU L. ; CHARBONNEAU J. ; VEZINA L.-P. ; GOSSELIN A. ;

Year 1994 Grandreau L, Charbonneau J, Vezina LP, Gosselin A

Report Name Photoperiod and photosynthetic flux influence growth and quality of greenhouse-grown lettuce

Publication In vitro breeding techniques. Workshop, University Park PA , ETATS-UNIS (23/07/1991)

Issue-page numbers 1994, vol. 29, no 11, pp. 1231-1246 (22 ref.), pp. 1285-1289

URL <http://cat.inist.fr/?aModele=afficheN&cpsid=3309974>

Abstract «Karls» and «Rosana», two Boston-type lettuce (*Lactuca saliva* L.) cultivars, were subjected to various light treatments in greenhouses equipped with one of two propane heating systems. Photoperiods of 16, 20, 24, or 24 hours for 2 weeks after transplanting and then 16 hours (2416) and photosynthetic photon flux of 50 or 100 $\mu\text{mol.m}^{-2}.\text{s}^{-1}$ provided by supplementary lighting (high-pressure sodium vapor lamps) were compared to natural light during four experiments performed in greenhouses between Sept. 1989 and May 1990. Using supplementary lighting resulted in significant increases in biomass ($\leq 270\%$), head firmness, and tipburn incidence and decreases in production cycle length ($\approx 30\%$)

Keywords

Authors Grunbaum, A., Orgel L.

Year 1998 Grunbaum A, Orgel L

Report Name Birds and prisons--an unlikely pairing

Publication Friends of Grays Harbor, FOGH

Issue-page numbers

URL <http://www.crcwater.org/issues2/foghbirds.html>

Abstract As you might know, The Washington Department of Corrections (Prisons) is planning to build a nearly 2,000 bed prison on the south shore of the Grays Harbor Estuary. What they continue to ignore is the potential risk to the over 500,000 shorebirds that use the south shore and Bowerman Basin (directly across from the prison location) for feeding grounds on their migration north to breeding grounds. The following are excerpts from "Collision Course: The Hazards of Lighted Structures and Windows to Migrating Birds" World Wildlife Fund Canada, September, 1996

Keywords

Authors John M. Gunn and David L. G. Noakes

Year 1986 Gunn JM, Noakes DLG

Report Name Avoidance of low pH and elevated Al concentrations by Brook Charr (*Salvelinus fontinalis*) Alevins in laboratory tests

Publication Water, Air, & Soil Pollution

Issue-page numbers Volume 30, Numbers 1-2, 497-503, DOI: 10.1007/BF00305218

URL <http://www.springerlink.com/content/m8j607671n87vt8v/>

Abstract Laboratory studies were conducted to test the ability of brook charr (*Salvelinus fontinalis*) alevins, the earliest free-swimming life stage of the species, to detect and avoid toxic levels of H⁺ and inorganic Al. Alevins were tested in steep gradient choice tanks using a range of H⁺ (pH 4.0 to 5.5) and Al (0 to 500 mg/L) concentrations in low Ca (2.0 mg/L) water. The young brook charr actively avoided acidic water with a pH < 5.0. Aluminum additions of 500 mg/L increased the avoidance response. The observed behavioral response of alevins to low pH and elevated levels of Al, may be of significant adaptive advantage in systems undergoing acidification.

Keywords

Authors John M. Gunn, David L. G. Noakes

Year 1987 Gunn JM, Noakes DLG

Report Name Latent Effects of Pulse Exposure to Aluminum and Low pH on Size, Ionic Composition, and Feeding Efficiency of Lake Trout (*Salvelinus namaycush*) Alevins

Publication Canadian Journal of Fisheries and Aquatic Sciences

Issue-page numbers 44:(8) 1418-1424, 10.1139/f87-170

URL <http://www.nrcresearchpress.com/doi/abs/10.1139/f87-170>

Abstract No mortality of lake trout (*Salvelinus namaycush*) embryos occurred during 5 d of exposure to aluminum concentrations of 0, 100, and 200 µg/L in low-pH (pH 5.0) water or during 21- and 32-d recovery periods, but alevins from the high-Al exposure were smaller in length, had less calcified skeletons, had reduced (18–22%) whole-body concentrations of Ca²⁺ and K⁺, and were less effective predators on *Daphnia magna*. These latent effects of pulse exposure to acidic Al-rich water may help explain the disappearance of lake trout populations from lakes with relatively high ambient pH.

Keywords

Authors J. M. Gunn, D. L. G. Noakes, G. F. Westlake

Year 1987 Gunn JM, Noakes DLG, Westlake GF

Report Name Behavioural responses of lake charr (*Salvelinus namaycush*) embryos to simulated acidic runoff conditions

Publication Canadian Journal of Zoology

Issue-page numbers 65:(11) 2786-2792, 10.1139/z87-420

URL <http://www.nrcresearchpress.com/doi/abs/10.1139/z87-420>

Abstract Lake charr (*Salvelinus namaycush*) embryos in the later stages of yolk absorption avoided water with pH < 6.0. The addition of inorganic Al ($\leq 200 \mu\text{g}\cdot\text{L}^{-1}$) did not increase the avoidance response to low pH. Embryos tested just after hatch had little swimming ability and showed no avoidance to acutely lethal H⁺ (pH 4.0). In vertical substrate-filled tanks that simulated conditions at natural spawning sites, there were no significant effects on embryo survival, or movement within the substrate from pulse exposure (8 h) to low pH (4.5) and elevated Al (100, 200, 500 $\mu\text{g}\cdot\text{L}^{-1}$). Preference for contact with the substrate appeared to override the avoidance reactions observed in horizontal counter-current tanks. Thigmotaxis, combined with poor swimming ability of embryos, appears to eliminate the possibility that lake charr embryos will effectively avoid the acidic runoff water that enters the rubble of spawning sites during snowmelt.

Keywords

Authors Hague

Year 2000 Hague

Report Name Impact of outdoor lighting on man and nature

Publication Health Council of the Netherlands

Issue-page numbers Publication no. 2000/25E

URL <http://www.gezondheidsraad.nl/en/publications/impact-outdoor-lighting-man-and-nature>

Abstract In this advisory report, the Health Council draws attention to the ongoing loss of darkness in the evening and at night and to the consequences of this loss for landscape quality and the human environment. Modern developments such as urbanization, increased motor traffic, increased greenhouse horticulture, more flexible working hours, a growing demand for outdoor sports facilities and an increasing tendency to floodlight business premises and historic buildings mean that darkness is being eliminated in a growing number of increasingly large areas. For a variety of reasons, many people regret these changes. Annoyance in residential areas and worries about possible harm to plant and animal life also warrant additional attention to this matter in the policy of central government and other regulatory bodies.

Keywords

Authors Hailman JP, Jaeger RG

Year 1978 Hailman JP, Jaeger RG

Report Name Phototactic responses of anuran amphibians to monochromatic stimuli of equal quantum intensity

Publication Anim Behav

Issue-page numbers Feb;26(1):274-81.

URL <http://www.ncbi.nlm.nih.gov/pubmed/637370>

Abstract The phototactic responses of anuran amphibians to narrow-band monochromatic stimuli of equal quantum intensity were measured for the first time in eight new experiments. The unimodal spectral response, obtained from dark-adapted American toads (*Bufo americanus*), peaks near 626 THz of frequency (480 nm wavelength). The bimodal, U-shaped spectral response, obtained from dark-adapted tailed frogs (*Ascaphus truei*), has the anti-mode at about 589 THz (510 nm) and is not merely the spectral mirror-image of the unimodal response. Absolute level of the spectral stimuli of equal quantum intensity did not affect the spectral response of dark-adapted toads, but light-adaptation enhanced a component that has the same spectral peak as the visual pigment absorption spectrum of principal and single cones of the frog's retina.

Keywords

Authors Hailman, Jack P.; Jaeger, Robert G.

Year 1975 Hailman JP, Jaeger RG

Report Name A Model of Phototaxis and Its Evaluation With Anuran Amphibians

Publication Behaviour

Issue-page numbers Volume 56, Numbers 3-4, 1976 , pp. 215-248(34)

URL <http://www.ingentaconnect.com/content/brill/beh/1976/00000056/F0020003/art00003>

Abstract

1. We propose a model of phototaxis based on the brightness-intensity function of the eye. Brightness (ψ) is a positive, monotonic function of the physical intensity (I). Electroretinographic studies of the anuran eye show brightness to be a sigmoid curve with intensity (measured logarithmically) - rather than obeying the WEBER-FECHNER Law or STEVENS' Power Law. Brightness-discrimination is best at the inflection-point of the curve (where $d^2\psi/dI^2 = 0$). 2. In our model the inflection-point determines the optimum ambient illumination (O.A.I.) for the animal. If ambient illumination is greater than the O.A.I., the animal is photonegative; if less than the O.A.I., the same animal is photopositive. When behaving photopositively, anuran amphibians show a blue color-preference, and when behaving photonegatively show a U-shaped spectral response, which may not involve color vision. When the ambient intensity is at the O.A.I., the animal shows a random response to spectral stimuli. 3. Four factors besides phototactic movements help the eye to maintain its best operating range for brightness-discrimination : (a) visual duplexity, or possession of different kinds of photoreceptor cells with different operating ranges; (b) pupillary responses, which control the amount of light falling on the retina; (c) migration of the pigment-epithelium, which controls the amount of light striking the individual photoreceptor cells; and (d) dark- and light-adaptation of receptor cells, which increase sensitivity in the dark and decrease it in the light. 4. Nine new experiments tested predictions of the effects of stimulus-intensity on phototactic preferences to intensity. Eight sets of results were consistent with the model. The exception was later shown to be due to two factors of uncontrolled variables. 5. Seven new experiments tested predictions of the effects of stimulus-intensity on phototactic preferences to spectral stimuli. All seven sets of results were consistent with the model. 6. Five new experiments and four previously reported experiments tested predictions of the effects of adaptational state on phototactic preferences to intensity. All nine sets of results were consistent with the model. 7. Five new experiments and four previously reported experiments tested predictions of the effects of adaptational state on the phototactic preferences to spectral stimuli. All nine sets of results were consistent with the model. 8. The model shows that species are not classifiable as "photopositive" or "photonegative" because every species shows both kinds of phototactic behavior. The model suggests that the physiological mechanisms for response to intensity and spectral stimuli are intimately related. Furthermore, the model interprets species-differences as due primarily to the intensity of the O.A.I., a set-point that could be under genetic control. We suggest that genetic experiments on the phototaxis of *Drosophila* would yield higher "heritability" scores if the intensity of the stimuli and the state of the animal's adaptation were brought under experimental control.

Keywords

Authors Jack P. Hailman, Robert G. Jaeger†

Year 1974 Hailman JP, Jaeger RG

Report Name Phototactic responses to spectrally dominant stimuli and use of colour vision by adult anuran amphibians: A comparative survey

Publication Animal Behaviour

Issue-page numbers Volume 22, Part 4, November 1974, Pages 757-795

URL <http://www.sciencedirect.com/science/article/pii/0003347274900025>

Abstract A comparative survey of 127 species of adult anuran amphibians, drawn from all six sub-orders and all but one of the seventeen families, revealed three basic phototactic responses to spectrally dominant stimuli: (1) a U-shaped response curve high at the ends of the spectrum (violet and red) and low in the middle (eleven species from six families); (2) a blue-mode response (107 species from thirteen families); and (3) random or unclassifiable responses (nine species from five families). The lack of taxonomic correlates suggests that the phototactic types evolved in anuran ancestors, and the lack of ecological correlates rejects Muntz's (1962) 'escape-to-water' functional hypothesis of the blue-mode phototaxis. Special 'colour-vs-brightness' (CvB) tests confirm that the blue-mode response involves true colour vision (sixteen species), but fails to provide such evidence for the U-shaped response (two species), which may therefore be merely a spectral sensitivity phenomenon. No effect on spectral responses was found according to intraspecific geographic variation, sex, ambient temperature, type of locomotion, time of day or time of year. There may be an effect of the adaptational state of the eye which demands fuller investigation. Of 116 species also tested for response to intensities of white light (Jaeger & Hailman 1973), 96 per cent obey the correlation of photonegativity with U-shaped response, photopositivity with blue-mode response and unimodal intensity preference with unclassifiable spectral response. Extending our previous model (Jaeger & Hailman 1973), we propose that every species has a preferred intensity, termed the optimum ambient illumination (OAI), and every species shows all three kinds of spectral responses. When ambient illumination is brighter than the species' OAI, the animal becomes photonegative and shows the U-shaped spectral response; when ambient is dimmer, the animal becomes photopositive and shows the blue-mode colour-preference; and when ambient is at the OAI, the animal strives to maintain that intensity while being indifferent to colours. A given species may appear to be photonegative or photopositive when the range of experimental intensities fails to include the species' OAI. The true adaptive differences among anuran species in phototactic behaviour lies only in the set-point of the OAI, which is at low intensities for nocturnal or fossorial species, and high for diurnal or open-habitat species. Aquatic species moving to the surface of a pond, terrestrial species moving toward breaks in the forest canopy, and arboreal species moving towards the crowns or branch-tips of trees all achieve a higher ambient illumination by photo-positive movements toward the blue light of sky. Finally, if our model be correct, Muntz's (1966) receptor-coding scheme is not adequate to explain the interrelations between responses to intensities and colours, so the physiological mechanism of phototaxis remains an open question.

Keywords

Authors Yaqi Haoa, Eunkyoo Oh, Giltsu Choi, Zongsuo Liang and Zhi-Yong Wang

Year 2012 Haoa Y, Oh E, Choi G, et al.

Report Name Interactions between HLH and bHLH Factors Modulate Light-Regulated Plant Development

Publication Mol. Plant

Issue-page numbers First published online: February 13, 2012

URL <http://mplant.oxfordjournals.org/content/early/2012/02/12/mp.sss011.short>

Abstract Phytochromes (Phy) and phytochrome-interacting factor (PIF) transcription factors constitute a major signaling module that controls plant development in response to red and far-red light. A low red:far-red ratio is interpreted as shading by neighbor plants and induces cell elongation—a phenomenon called shade-avoidance syndrome (SAS). PAR1 and its closest homolog PAR2 are negative regulators of SAS; they belong to the HLH transcription factor family that lacks a typical basic domain required for DNA binding, and they are believed to regulate gene expressions through DNA binding transcription factors that are yet to be identified. Here, we show that light signal stabilizes PAR1 protein and PAR1 interacts with PIF4 and inhibits PIF4-mediated gene activation. DNA pull-down and chromatin immunoprecipitation (ChIP) assays showed that PAR1 inhibits PIF4 DNA binding in vitro and in vivo. Transgenic plants overexpressing PAR1 (PAR1OX) are insensitive to gibberellin (GA) or high temperature in hypocotyl elongation, similarly to the pifq mutant. In addition to PIF4, PAR1 also interacts with PRE1, a HLH transcription factor activated by brassinosteroid (BR) and GA. Overexpression of PRE1 largely suppressed the dwarf phenotype of PAR1OX. These results indicate that PAR1–PRE1 and PAR1–PIF4 heterodimers form a complex HLH/bHLH network regulating cell elongation and plant development in response to light and hormones.

Keywords PAR1, PIF4, PRE1, bHLH, DNA binding

Authors	Ben Harder
Year	2002 Harder B
Report Name	Deprived of darkness: The unnatural ecology of artificial light at night
Publication	Science News
Issue-page numbers	Volume 161, Issue 16, pages 248–249, 20 April 2002
URL	http://onlinelibrary.wiley.com/doi/10.2307/4013350/abstract

Abstract In 1988, physician and amateur moth enthusiast Kenneth D. Frank published a scientific paper that pulled together much of what researchers then knew about the consequences of artificial night-time lighting on moths. That paper is the closest thing the nascent field of artificial-light ecology has to a classic work. It didn't exactly trigger the response one might expect from a seminal study, however. The report has received precious little attention and stimulated no immediate cascade of follow-up research.

Frank recently searched the scientific literature to count how many subsequent papers had made reference to his study—and found exactly one.

Nevertheless, Frank and a handful of other scientists are endeavoring to synthesize a coherent understanding of the ecological impacts of artificial light on a multitude of organisms. These efforts are gradually gaining momentum.

From anecdotal reports of little-studied phenomena—such as moths' tendency to perish, Icarus-style, in lamps and flames—researchers suspect that artificial night lighting disrupts the physiology and behavior of nocturnal animals. In many cases, scientists have few reliable data on which to rest conclusions—but every reason to be concerned. <http://www.celfosc.org/biblio/bio/020420sciweek.htm>

Keywords

Authors	Asanchia Harewood, Julia Horrocks
Year	2008 Harewood A, Horrocks J
Report Name	Impacts of coastal development on hawksbill hatchling survival and swimming success during the initial offshore migration
Publication	Biological Conservation
Issue-page numbers	Volume 141, Issue 2, February 2008, Pages 394-401
URL	http://www.sciencedirect.com/science/article/pii/S0006320707004144

Abstract The impacts of coastal development on survival and swimming success were investigated for hatchling hawksbill turtles (*Eretmochelys imbricata*) swimming away from artificially lighted and dark nesting beaches in Barbados. The overall predation rate was 6.9%. Predation rates were not significantly affected by offshore substrate type or beachfront lighting. However, of those hatchlings leaving lighted beaches that successfully escaped predation, a significantly smaller percentage (32.9%) were able to swim the prescribed distance seawards during the observation period. Moonlight significantly improved the swimming success of hatchlings leaving lighted beaches, particularly when the moon was full, but also significantly influenced predation rates, which were highest during the full moon (12.6%). Some hatchlings released from dark beaches were attracted by lights from neighbouring beaches, which only became visible after they were a substantial distance from shore. Artificial light may override the effects of wave cues in the low wave energy conditions characteristic of leeward Caribbean beaches, making swimming hawksbill hatchlings especially vulnerable to the effects of beachfront lighting.

Keywords Sea turtle; Predation; Artificial light; Moon phase

Authors James G. Hartman, Jack P. Hailman

Year 1981 Hartman JG, Hailman JP

Report Name Interactions of Light Intensity, Spectral Dominance and Adaptational State in Controlling Anuran Phototaxis

Publication Zeitschrift für Tierpsychologie

Issue-page numbers Volume 56, Issue 4, pages 289–296, January-December 1981

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1439-0310.1981.tb01302.x/abstract>

Abstract We performed 12 experiments on phototactic behavior of frogs to test the following hypotheses: (a) there is a preferred intensity for light of every color, (b) such intensity-preferences differ among colors, (c) such intensity-preferences are shifted to lower intensities by dark-adaptation, and (d) the magnitude of such adaptional shifts themselves also differs among colors. The data were consistent with all four hypotheses.

Keywords

Authors Nail M. Hasan

Year 2011 Hasan NM

Report Name Comparison of the onset of dawn chorus of bulbuls and house sparrows in two different geographical locations: effect of climate, noise and light pollution

Publication RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Issue-page numbers 2011, 1(4), 220-225

URL http://roavs.com/pdf-files/vol_4_2011/220-225.pdf

Abstract The onset of dawn chorus was studied for a period of fourteen months for bulbuls (Pycnonotidae) and house sparrows (Passer domesticus) in two different geographical locations. One is very quiet and semi lit place in the suburbs of the small Mediterranean city of Tulkarem/Palestinian Authority. The other location is comparatively noisy and very well lit place in the Ar-Rayyan urban district of the city of Riyadh/ Saudi Arabia where desert climate prevails. This study is the first of its kind and clearly shows that the timing of dawn chorus is similar for autumn and winter seasons in both locations but major differences were observed from February until September between the two locations. It can be concluded that very early timing of dawn chorus during spring / summer for the Riyadh location cannot only be attributed to breeding season and is temperature dependent (strong positive correlation, $r > 0.6$). The similarities for autumn and early winter between the two locations is very interesting in that it is not in agreement with the notion that big cities (urbanization) influence the timing of dawn chorus due to noise and light pollution. This emphasizes that dawn chorus is a complex process and that change in the onset and pattern of dawn chorus can not merely be attributed to one variable such as noise or light pollution alone.

Keywords Bulbuls, House Sparrows, Dawn Chorus, Climate, Temperature, Noise, Light, Pollution

Authors Hausmann A.

Year 1992 Hausmann A

Report Name Untersuchungen zum Massensterben von Nachtfaltern an Industriebeleuchtungen

Publication (Lepidoptera, Macroheterocera), Atalanta,

Issue-page numbers 23 (3/4): 411-416

URL N/A

Abstract N/A

Keywords

Authors Maki Hayashi, Shin-ichiro Inoue, Koji Takahashi and Toshinori Kinoshita

Year 2011 Hayashi M, Inoue S, Takahashi K, Kinoshita T

Report Name Immunohistochemical Detection of Blue Light-Induced Phosphorylation of the Plasma Membrane H⁺-ATPase in Stomatal Guard Cells

Publication Plant Cell Physiol

Issue-page numbers (2011) 52 (7): 1238-1248. doi: 10.1093/pcp/pcr072

URL <http://pcp.oxfordjournals.org/content/52/7/1238.short>

Abstract Blue light (BL) receptor phototropins activate the plasma membrane H⁺-ATPase in guard cells through phosphorylation of a penultimate threonine and subsequent binding of the 14-3-3 protein to the phosphorylated C-terminus of H⁺-ATPase, mediating stomatal opening. To date, detection of the phosphorylation level of the guard cell H⁺-ATPase has been performed biochemically using guard cell protoplasts (GCPs). However, preparation of GCPs from Arabidopsis for this purpose requires >5,000 rosette leaves and takes >8 h. Here, we show that BL-induced phosphorylation of guard cell H⁺-ATPase is detected in the epidermis from a single Arabidopsis rosette leaf via an immunohistochemical method using a specific antibody against the phosphorylated penultimate threonine of H⁺-ATPase. BL-induced phosphorylation of the H⁺-ATPase was detected immunohistochemically in the wild type, but not in a phot1-5 phot2-1 double mutant. Moreover, we found that physiological concentrations of the phytohormone ABA completely inhibited BL-induced phosphorylation of guard cell H⁺-ATPase in the epidermis, and that inhibition by ABA in the epidermis is more sensitive than in GCPs. These results indicate that this immunohistochemical method is very useful for detecting the phosphorylation status of guard cell H⁺-ATPase. Thus, we applied this technique to ABA-insensitive mutants (abi1-1, abi2-1 and ost1-2) and found that ABA had no effect on BL-induced phosphorylation in these mutants. These results indicate that inhibition of BL-induced phosphorylation of guard cell H⁺-ATPase by ABA is regulated by ABI1, ABI2 and OST1, which are known to be early ABA signaling components for a wide range of ABA responses in plants.

Keywords ABA, Arabidopsis thaliana, Blue light, Guard cell, Phosphorylation, Plasma membrane H⁺-ATPase

Authors Gerard T. Haymes, Paul H. Patrick, Lawrence J. Onisto

Year 1984 Haymes GT, Patrick PH, Onisto LJ

Report Name Attraction of fish to mercury vapor light and its application in a generating station forebay

Publication Internationale Revue der gesamten Hydrobiologie und Hydrographie

Issue-page numbers Volume 69, Issue 6, pages 867–876, 1984

URL <http://onlinelibrary.wiley.com/doi/10.1002/iroh.19840690610/abstract>

Abstract Laboratory and field tests were conducted to determine the effectiveness of filtered mercury vapour lights in attracting fish with possible utilization in a fish conserving scheme at an electrical generating station. In laboratory tests, alewife demonstrated an attraction to the mercury vapour light which was associated with an increase in swimming activity. This response was maintained over a 48-hour period. When the filtered mercury vapour lights were utilized in association with a fish pump in the Nanticoke Generating Station forebay, juvenile gizzard shad and smelt were attracted to the pump area. Although there was variation with time of day, turbidity and lighting array; the results suggested that the number of fish passing through the pump increased when the mercury vapour lights alone or when the mercury lights in association with a white strobe light were employed.

Keywords attraction; lights; pelagic fish; electrical generation; impingement

Authors Marc Heijde, Roman Ulm

Year 2012 Heijde M, Ulm R

Report Name UV-B photoreceptor-mediated signalling in plants

Publication Trends in Plant Science

Issue-page numbers Trends in Plant Science

URL <http://www.sciencedirect.com/science/article/pii/S1360138512000088>

Abstract Ultraviolet-B radiation (UV-B) is a key environmental signal that is specifically perceived by plants to promote UV acclimation and survival in sunlight. Whereas the plant photoreceptors for visible light are rather well characterised, the UV-B photoreceptor UVR8 was only recently described at the molecular level. Here, we review the current understanding of the UVR8 photoreceptor-mediated pathway in the context of UV-B perception mechanism, early signalling components and physiological responses. We further outline the commonalities in UV-B and visible light signalling as well as highlight differences between these pathways.

Keywords

Authors Astrid M Heiling

Year 1999 Heiling AM

Report Name Why do nocturnal orb-web spiders (Araneidae) search for light?

Publication Behavioral Ecology and Sociobiology

Issue-page numbers Volume: 46, Issue: 1, Pages: 43-49

URL <http://www.mendeley.com/research/nocturnal-orbweb-spiders-araneidae-search-light-2/>

Abstract The nocturnal orb-web spider *Larinioides sclopetarius* lives near water and frequently builds webs on bridges. In Vienna, Austria, this species is particularly abundant along the artificially lit handrails of a footbridge. Fewer individuals placed their webs on structurally identical but unlit handrails of the same footbridge. A census of the potential prey available to the spiders and the actual prey captured in the webs revealed that insect activity was significantly greater and consequently webs captured significantly more prey in the lit habitat compared to the unlit habitat. A laboratory experiment showed that adult female spiders actively choose artificially lit sites for web construction. Furthermore, this behaviour appears to be genetically predetermined rather than learned, as laboratory-reared individuals which had previously never foraged in artificial light exhibited the same preference. This orb-web spider seems to have evolved a foraging behaviour that exploits the attraction of insects to artificial lights.

Keywords *larinioides sclopetarius*, density á prey availability, light preference á spider, web site choice

Authors Henderson, R.W., and R. Powell.

Year 2001 Henderson RW, Powell R

Report Name Responses by the West Indian Herpetofauna to human-induced resources

Publication Caribbean Journal of Science

Issue-page numbers 37(1-2): 41-54

URL <http://caribjsci.org/>

Abstract N/A

Keywords

Authors Herbert, A.D.

Year 1970 Herbert AD

Report Name Spatial Disorientation in Birds

Publication Wilson Bulletin

Issue-page numbers 82, 400-419

URL <http://library.unm.edu/sora/Wilson/v082n04/p0400-p0419.pdf>

Abstract N/A

Keywords

Authors E.M Hevrøy, K Boxaspen, F Oppedal, G.L Taranger, J.C Holm

Year 2003 Hevrøy EM, Boxaspen K, Oppedal F, et al.

Report Name The effect of artificial light treatment and depth on the infestation of the sea louse *Lepeophtheirus salmonis* on Atlantic salmon (*Salmo salar* L.) culture

Publication Aquaculture

Issue-page numbers Volume 220, Issues 1-4, 14 April 2003, Pages 1-14

URL <http://www.sciencedirect.com/science/article/pii/S0044848602001898>

Abstract Two field studies were carried out with farmed Atlantic salmon (*Salmo salar* L.) in sea cages to examine various effects of artificial light (AL) and the vertical distribution of salmon on lice infestation.

The use of AL light caused an overall increase in lice infestation in both experiments. The first study showed that salmon held at 0–4 m depth in cages developed higher infestation than salmon held at greater depths (4–8 and 8–12 m) under both natural light (NL) and AL. In the second study, salmon maintained in 14-m deep sea cages that were exposed to AL with different light intensities. The AL treatments resulted directly in different diel and seasonal patterns of vertical distribution of the salmon and also different temporal patterns in lice infestations. So indirectly the infestation pattern appeared to be correlated with median day-time swimming depth of the salmon.

Keywords Swimming behaviour; Artificial light; Sea lice; *Lepeophtheirus salmonis*; Infestation; Atlantic salmon; *Salmo salar*

Authors M B C Hickey, L Acharya, S Pennington

Year 1996 Hickey MBC, Acharya L, Pennington S

Report Name Resource partitioning by two species of Vespertilionid bats (*Lasiurus cinereus* and *Lasiurus borealis*) feeding around street lights

Publication Journal of Mammalogy

Issue-page numbers Volume: 77, Issue: 2, Pages: 325-334

URL <http://www.mendeley.com/research/resource-partitioning-two-species-vespertilionid-bats-lasiurus-cinereus-lasiurus-borealis-feeding-around-street-lights-1/>

Abstract Partitioning of resources between *Lasiurus cinereus* and *L. borealis* was studied at a site where these species feed on insects (mostly moths) that fly around street lights. No consistent evidence of temporal resource partitioning was found in 4 years of observation. For 3 years of analysis of diets, the food-niche breadth of *L. cinereus* (25-35 g) was consistently larger than that of *L. borealis* (7-13 g). Niche overlap varied among years and was highest in a year when availability of insects was unusually low.

Keywords

Authors A. Curtis Higginbotham

Year 1939 Higginbotham AC

Report Name Studies on amphibian activity. I. preliminary report on the rhythmic activity of *Bufo americanus* Holbrook and *Bufo Fowleri* Hinckley

Publication Ecology

Issue-page numbers 20:58–70. [doi:10.2307/1930804]

URL <http://www.esajournals.org/doi/abs/10.2307/1930804>

Abstract N/A

Keywords

Authors Hill, D

Year 1992 Hill D

Report Name The impact of noise and artificial light on waterfowl behavior: a review and synthesis of available literature

Publication British Trust for Ornithology

Issue-page numbers Research Report No. 61

URL <http://www.amazon.com/Impact-Noise-Artificial-Waterfowl-Behaviour/dp/0903793245>

Abstract Book

Keywords

Authors Kenichi Hitomi, Andrew S. Arvai, Junpei Yamamoto, Chiharu Hitomi, Mika Teranishi, Tokuhisa Hirouchi, Kazuo Yamamoto, Shigenori Iwai, John A. Tainer, Jun Hidema and

Year 2011 Hitomi K, Arvai AS, Yamamoto J, et al.

Report Name Eukaryotic Class II CPD photolyase structure reveals a basis for improved UV-tolerance in plants

Publication American Society for Biochemistry and Molecular Biology

Issue-page numbers doi: 10.1074/jbc.M111.244020 jbc.M111.244020.

URL <http://www.jbc.org/content/early/2011/12/14/jbc.M111.244020.short>

Abstract Ozone depletion increases terrestrial solar ultraviolet-B (UV-B; 280-315 nm) radiation, intensifying the risks plants face from DNA damage, especially covalent pyrimidine dimers. Without efficient repair, UV-B destroys genetic integrity, but plant breeding creates rice cultivars with more robust photolyase (PHR) DNA repair activity as an environmental adaptation. So, improved strains of *Oryza sativa* (rice), the staple food for Asia, have expanded rice cultivation worldwide. Efficient light-driven PHR enzymes restore normal pyrimidines to UV-damaged DNA by using blue light via flavin adenine dinucleotide to break pyrimidine dimers. Eukaryotes duplicated the photolyase gene, producing PHRs that gained functions and adopted activities that are distinct from those of prokaryotic PHRs, yet incompletely understood. Many multi-cellular organisms have two types of PHR: (6-4) PHR, which structurally resembles bacterial CPD PHRs but recognizes different substrates, and Class II CPD PHR, which is remarkably dissimilar in sequence from bacterial PHRs, despite their common substrate. To understand the enigmatic DNA repair mechanisms of PHRs in eukaryotic cells, we determined the first crystal structure of a eukaryotic Class II CPD PHR from the rice cultivar Sasanishiki. Our 1.7 Å resolution PHR structure reveals structure-activity relationships in Class II PHRs and tuning for enhanced UV-tolerance in plants. Structural comparisons with prokaryotic Class I CPD PHRs identified differences in the binding site for UV-damaged DNA substrate. Convergent evolution of both flavin hydrogen bonding and a Trp electron transfer pathway establish these as critical functional features for PHRs. These results provide a paradigm for light-dependent DNA repair in higher organisms.

Keywords DNA repair, Flavoproteins, Photoreceptors, Plant, X-ray crystallography

Authors Chen Ying Ho, Hsien Te Lin, Kuang Yu Huang

Year 0 Ho CY, Lin HT, Huang KY

Report Name A Study on Energy Saving and Light Pollution of LED Advertising Signs

Publication Applied Mechanics and Materials

Issue-page numbers 121-126, 2979-2984 DOI:10.4028/www.scientific.net/AMM.121-126.2979

URL <http://www.scientific.net/AMM.121-126.2979>

Abstract Lighting advertising signs not only play an important role in outdoor lighting environment in Taiwan, but also become the main factor of energy consumption in urban areas at night. Light-emitting diode (LED) has been gradually used in advertising signs due to its advantages. However, in order to be conspicuous and legible in the daytime, signs that are excessively bright may result in considerable light pollution and energy waste at nighttime. Therefore, this research aims to measure the luminance of LED signs and traditional internally lighted signs, and analyze the light trespass from each signage. Based on the research results, the energy consumption from a LED full color screen is 12 times more than a traditional internally lighted sign per day. Statistically, all kinds of LED signs are much higher than traditional internally lighted signs in the percentage of excessive brightness and average luminance value. As for the light trespass, since the vertical illuminance on facade facing the signs increases with the increase of the sign area or the decrease of the distance between the sign and the facade, the vertical illuminance on facade facing the signs would exceed the limit of CIE even if the luminance of the signs achieves the standard of CIE in terms of the general conditions in Taiwan. This happens to LED full color screens in particular and thus results in considerable obtrusive light. To sum up, in order to reduce unnecessary energy consumption and improve the nighttime lighting quality for outdoor environment, this research recommends the luminance limitation for light dimming of LED advertising signs should refer to the zoning, time period, and sign area.

Keywords

Authors Franz Hölker, Timothy Moss, Barbara Griefahn, Werner Kloas, Christian C. Voigt, Dietrich Henckel, Andreas Hänel, Peter M. Kappeler, Stephan Völker, Axel Schwöpe, Steffen Fr

Year 2010 Hölker F, Moss T, Griefahn B, et al.

Report Name The Dark Side of Light: A Transdisciplinary Research Agenda for Light Pollution Policy

Publication Ecology and Society

Issue-page numbers 15(4): 13.

URL <http://www.ecologyandsociety.org/vol15/iss4/art13/>

Abstract Although the invention and widespread use of artificial light is clearly one of the most important human technological advances, the transformation of nightscapes is increasingly recognized as having adverse effects. Night lighting may have serious physiological consequences for humans, ecological and evolutionary implications for animal and plant populations, and may reshape entire ecosystems. However, knowledge on the adverse effects of light pollution is vague. In response to climate change and energy shortages, many countries, regions, and communities are developing new lighting programs and concepts with a strong focus on energy efficiency and greenhouse gas emissions. Given the dramatic increase in artificial light at night (0 - 20% per year, depending on geographic region), we see an urgent need for light pollution policies that go beyond energy efficiency to include human well-being, the structure and functioning of ecosystems, and inter-related socioeconomic consequences. Such a policy shift will require a sound transdisciplinary understanding of the significance of the night, and its loss, for humans and the natural systems upon which we depend. Knowledge is also urgently needed on suitable lighting technologies and concepts which are ecologically, socially, and economically sustainable. Unless managing darkness becomes an integral part of future conservation and lighting policies, modern society may run into a global self-experiment with unpredictable outcomes.

Keywords artificial light; energy efficiency; lighting concept; light pollution; nightscape; policy; sustainability; transdisciplinary

Authors Franz Hölker, Christian Wolter, Elizabeth K. Perkin, Klement Tockner

Year 2010 Hölker F, Wolter C, Perkin EK, Tockner K

Report Name Light pollution as a biodiversity threat

Publication Trends in Ecology & Evolution

Issue-page numbers Volume 25, Issue 12, December 2010, Pages 681-682

URL <http://www.sciencedirect.com/science/article/pii/S0169534710002211>

Abstract N/A

Keywords

Authors Hopkins, W., Hillman, W

Year 1965 Hopkins W, Hillman W

Report Name Response of excited Avena coleoptile segments to red and far-red light

Publication Planta

Issue-page numbers 65, 157-166

URL N/A

Abstract N/A

Keywords

Authors Kenneth Horch, Michael Salmon

Year 2009 Horch K, Salmon M

Report Name Frequency response characteristics of isolated retinas from hatchling leatherback (*Dermochelys coriacea* L.) and loggerhead (*Caretta caretta* L.) sea turtles

Publication Journal of Neuroscience Methods

Issue-page numbers Volume 178, Issue 2, 15 April 2009, Pages 276-283

URL <http://www.sciencedirect.com/science/article/pii/S0165027008007164>

Abstract Electroretinographic recordings were made from hatchling loggerhead and leatherback sea turtle eyecup preparations during presentation of sinusoidally modulated lights of different frequencies, mean intensities and colors. Cross-correlation analysis was performed to determine the extent to which the responses followed the intensity modulated light sources. For both species mean light intensity had no significant effect on the frequency modulated responses over a 1.5 log unit range of intensities. Both species showed the best following to blue light and the poorest tracking to red light. Leatherback retinas did not follow frequencies above 10 Hz, while loggerhead responses extended out to 15 Hz. These visual low pass filter characteristics are consistent with attributes of the visual ecology of each species, as well as with the latencies and slow rise times exhibited by these retinas to brief flashes of light.

Keywords Vision; Electroretinogram; Marine turtle; Leatherback; Loggerhead; Frequency sensitivity

Authors Gábor Horváth, György Kriska, Péter Malik, Ramón Hegedüs, László Neumann, Susanne Åkesson, Bruce Robertson

Year 0 Horváth G, Kriska G, Malik P, et al.

Report Name ASPHALT SURFACES AS ECOLOGICAL TRAPS FOR WATER-SEEKING POLAROTACTIC INSECTS: HOW CAN THE POLARIZED LIGHT POLLUTION OF ASPHALT SURF

Publication Book

Issue-page numbers Webbook

URL <http://www.kriskagyorgy.freeweb.hu/40.pdf>

Abstract

The surface of dry or wet asphalt roads reflects partially linearly polarized light, the degree of linear polarization p of which depends on the darkness and roughness of asphalt: the darker and/or the smoother the asphalt, the higher the p of light reflected from it. If the asphalt is sunlit and the direction of view is parallel to the solar-antisolar meridian, then the direction of polarization of asphalt-reflected light is horizontal. In this case the asphalt surface can attract water-seeking aquatic insects, because they detect water by means of the horizontal polarization of light reflected from the water surface. This phenomenon is called positive polarotaxis. Polarotactic insects mistaking asphalt surfaces for water bodies lay their eggs upon dry asphalt after copulation, where the eggs perish due to dehydration. The polarization signal of the asphalt surface can be so strong that insects can actively prefer asphalt over water as an oviposition site. This phenomenon is well studied for mass-swarming mayflies, but other polarotactic insects, such as dragonflies, caddisflies, stoneflies, water beetles and aquatic bugs can also be deceived by and attracted to asphalt roads near natural water bodies. We refer to the negative survival and reproductive consequences of artificial sources of polarized light on polarotactic organisms as polarized light pollution. Highly and horizontally polarizing asphalt roads are sources of polarized light pollution that can create ecological traps for polarotactic insects when they become more attractive than natural habitats. Trapped populations are predicted to have a high probability of extinction, and so paved surfaces may threaten populations of endangered aquatic insect species. An ecological trap for water insects can further trigger a secondary ecological trap for other vertebrate species that prey upon the water insects attracted to the asphalt: these insects and the carcasses of vehicle-killed polarotactic insects can attract different insectivorous vertebrates, especially birds, which can also be run down by the cars. In this work we study the polarizing characteristics of asphalt surfaces as functions of the surface features (roughness, darkness, painted with white striates or not), the illumination conditions (sunny or shady), and the direction of view relative to the solar meridian. On the basis of these data we suggest some possible strategies to mitigate the severity of polarized light pollution produced by asphalt. In areas with gravel roads, for example, change of the gravel to the more insect-attracting asphalt should, if possible, be avoided. We show how the degree of polarization p of asphalt-reflected light can be reduced under the threshold of polarization sensitivity of aquatic insects: the roughness, brightness and white-striateness of the asphalt surface should be increased in order to reduce p , and thus the attractiveness to polarotactic insects. We propose

the use of these remedies on asphalt roads running near emergence sites of endangered aquatic insects, especially in the vicinity of wetlands, rivers and lakes. Conservation biologists may effect substantial benefits for aquatic insects and their ecosystems by working with asphalt road planners to reduce the attractiveness of asphalt surfaces to polarotactic species.

Keywords

Authors Gábor Horváth, György Kriska, Péter Malik, and Bruce Robertson

Year 2009 Horváth G, Kriska G, Malik P, Robertson B

Report Name Polarized light pollution: a new kind of ecological photopollution

Publication Frontiers in Ecology and the Environment

Issue-page numbers 7: 317–325

URL <http://www.esajournals.org/doi/abs/10.1890/080129>

Abstract The alteration of natural cycles of light and dark by artificial light sources has deleterious impacts on animals and ecosystems. Many animals can also exploit a unique characteristic of light – its direction of polarization – as a source of information. We introduce the term “polarized light pollution” (PLP) to focus attention on the ecological consequences of light that has been polarized through interaction with human-made objects. Unnatural polarized light sources can trigger maladaptive behaviors in polarization-sensitive taxa and alter ecological interactions. PLP is an increasingly common byproduct of human technology, and mitigating its effects through selective use of building materials is a realistic solution. Our understanding of how most species use polarization vision is limited, but the capacity of PLP to drastically increase mortality and reproductive failure in animal populations suggests that PLP should become a focus for conservation biologists and resource managers alike.

Keywords

Authors Gábor Horváth, György Kriska, Péter Malik, and Bruce Robertson

Year 2009 Horváth G, Kriska G, Malik P, Robertson B

Report Name Polarized light pollution: a new kind of ecological photopollution

Publication http://arago.elte.hu/files/PolLightPollution_FEE_0.pdf

Issue-page numbers 7(6): 317–325, doi:10.1890/080129

URL http://arago.elte.hu/files/PolLightPollution_FEE_0.pdf

Abstract The alteration of natural cycles of light and dark by artificial light sources has deleterious impacts on animals and ecosystems. Many animals can also exploit a unique characteristic of light – its direction of polarization as a source of information. We introduce the term “polarized light pollution” (PLP) to focus attention on the ecological consequences of light that has been polarized through interaction with human-made objects. Unnatural polarized light sources can trigger maladaptive behaviors in polarization-sensitive taxa and alter ecological interactions. PLP is an increasingly common byproduct of human technology, and mitigating its effects through selective use of building materials is a realistic solution. Our understanding of how most species use polarization vision is limited, but the capacity of PLP to drastically increase mortality and reproductive failure in animal populations suggests that PLP should become a focus for conservation biologists and resource managers alike.

Keywords

Authors Gábor Horváth, Arnold Móra, Balázs Bernáth, György Kriska

Year 2011 Horváth G, Móra A, Bernáth B, Kriska G

Report Name Polarotaxis in non-biting midges: Female chironomids are attracted to horizontally polarized light

Publication Physiology & Behavior

Issue-page numbers Volume 104, Issue 5, 24 October 2011, Pages 1010-1015

URL <http://www.sciencedirect.com/science/article/pii/S0031938411003489>

Abstract Non-biting midges (Chironomidae, Diptera) are widely distributed aquatic insects. The short-living chironomid adults swarm in large numbers above water surfaces, and are sometimes considered a nuisance. They are vectors of certain bacteria, and have a key-role in benthic ecosystems. Optical cues, involving reflection-polarization from water, were found to be important in the habitat selection by three Mediterranean freshwater chironomid species. In this work we report on our multiple-choice experiments performed in the field with several other European freshwater chironomid species. We show that the investigated non-biting midges are positively polarotactic and like many other aquatic insects their females are attracted to horizontally polarized light. Our finding is important in the visual ecology of chironomids and useful in the design of traps for these insects.

Keywords Chironomids; Non-biting midges; Oviposition site selection; Positive polarotaxis; Polarization vision; Visual ecology

Authors Hermann Hötker

Year 1999 Hötker H

Report Name What determines the time-activity budgets of avocets (*Recurvirostra avosetta*)?

Publication Journal of Ornithology

Issue-page numbers Volume 140, Number 1, 57-71, DOI: 10.1007/BF02462089

URL <http://www.springerlink.com/content/t564837g52058446/>

Abstract Time-activity budgets of birds are known to be affected by many different factors. The aim of this study is to explain the intra-specific variation of activity patterns (in particular foraging activity) of one particular wader, the Avocet. Sixty-seven series of scan observations of 12 h to 12.5 h length were made at several sites on the flyway of the northwest European population and at various stages in the species' annual cycle. In estuarine habitats the activity pattern was mainly influenced by the tide. As soon as the conditions allowed (neap tides) Avocets abandoned the tidal rhythm. No time of day effects on activity patterns could be detected. Activity patterns by day and at night were essentially the same, except during very dark nights (owing to artificial illumination at some of the study sites such nights were a rare event), when foraging activity was reduced. The breeding season induced considerable changes of the activity patterns, including a reduction of foraging time to less than 20% of the budget at the end of the breeding season. Outside the breeding season, activity patterns were mainly influenced by the type of food (fish: reduced foraging time. Chironomid larvae: prolonged foraging time), by temperature (increase of foraging time with decreasing temperature), by windspeed (reduction of foraging time at wind speeds above 10 m/s) and by the darkness of the previous night (compensatory feeding after dark nights).

Keywords

Authors Hubbs, C.

Year 1965 Hubbs C

Report Name Developmental temperature tolerance and rates of four southern California fishes

Publication California Fish and Game

Issue-page numbers 51(2):113-122

URL N/A

Abstract California killifish eggs hatch more slowly in total darkness while light seems to kill California Grunion eggs

Keywords

Authors L Hughes, A Cornett, K Garrett, M Salmon, A Broadwell

Year 2003 Hughes L, Cornett A, Garrett K, et al.

Report Name The influence of embedded roadway lighting on the orientation of hatchling sea turtles (Caretta caretta)

Publication TwentySecond Annual Symposium on Sea Turtle Biology and Conservation (2003)

Issue-page numbers Volume: NOAA Techn, Pages: 211

URL <http://www.mendeley.com/research/influence-embedded-roadway-lighting-orientation-hatchling-sea-turtles-caretta-caretta-1/>

Abstract

Keywords

Authors Humphrey-Smith, I.

Year 1982 Humphrey-Smith I

Report Name Survival of Captive Microchiroptera Feeding on Prey Attracted to Artificial Lights

Publication in: The Management of Australian Mammals in Captivity, ed. D. D. Evans

Issue-page numbers 164-171

URL <http://www.biblio.com/9780724137671>

Abstract N/A

Keywords

Authors R. A. Hut and D. G. M. Beersma

Year 2011 Hut RA, Beersma DGM

Report Name Evolution of time-keeping mechanisms: early emergence and adaptation to photoperiod

Publication Phil. Trans. R. Soc. B

Issue-page numbers 27 July 2011 vol. 366 no. 1574 2141-2154

URL <http://rstb.royalsocietypublishing.org/content/366/1574/2141.short>

Abstract Virtually all species have developed cellular oscillations and mechanisms that synchronize these cellular oscillations to environmental cycles. Such environmental cycles in biotic (e.g. food availability and predation risk) or abiotic (e.g. temperature and light) factors may occur on a daily, annual or tidal time scale. Internal timing mechanisms may facilitate behavioural or physiological adaptation to such changes in environmental conditions. These timing mechanisms commonly involve an internal molecular oscillator (a 'clock') that is synchronized ('entrained') to the environmental cycle by receptor mechanisms responding to relevant environmental signals ('Zeitgeber', i.e. German for time-giver). To understand the evolution of such timing mechanisms, we have to understand the mechanisms leading to selective advantage. Although major advances have been made in our understanding of the physiological and molecular mechanisms driving internal cycles (proximate questions), studies identifying mechanisms of natural selection on clock systems (ultimate questions) are rather limited. Here, we discuss the selective advantage of a circadian system and how its adaptation to day length variation may have a functional role in optimizing seasonal timing. We discuss various cases where selective advantages of circadian timing mechanisms have been shown and cases where temporarily loss of circadian timing may cause selective advantage. We suggest an explanation for why a circadian timing system has emerged in primitive life forms like cyanobacteria and we evaluate a possible molecular mechanism that enabled these bacteria to adapt to seasonal variation in day length. We further discuss how the role of the circadian system in photoperiodic time measurement may explain differential selection pressures on circadian period when species are exposed to changing climatic conditions (e.g. global warming) or when they expand their geographical range to different latitudes or altitudes.

Keywords circadian system, photoperiodism, cyanobacteria, seasonal adaptation, suprachiasmatic nucleus, chronobiology

Authors Hironori Itoh, Yasunori Nonoue, Masahiro Yano, Takeshi Izawa

Year 2010 Itoh H, Nonoue Y, Yano M, Izawa T

Report Name A pair of floral regulators sets critical day length for Hd3a florigen expression in rice

Publication Nature Genetics

Issue-page numbers 42, Pages: 635–638 (2010) DOI: doi:10.1038/ng.606

URL <http://www.nature.com/ng/journal/v42/n7/abs/ng.606.html>

Abstract The critical day length triggering photoperiodic flowering is set as an acute, accurate threshold in many short-day plants, including rice^{1, 2}. Here, we show that, unlike the Arabidopsis florigen gene FT3, the rice florigen gene Hd3a (Heading date 3a) is toggled by only a 30-min day-length reduction. Hd3a expression is induced by Ehd1 (Early heading date 1) expression when blue light coincides with the morning phase set by OsGIGANTEA(OsGI)-dependent circadian clocks. Ehd1 expression is repressed by both night breaks under short-day conditions and morning light signals under long-day conditions. Ghd7 (Grain number, plant height and heading date 7) was acutely induced when phytochrome signals coincided with a photosensitive phase set differently by distinct photoperiods and this induction repressed Ehd1 the next morning. Thus, two distinct gating mechanisms—of the floral promoter Ehd1 and the floral repressor Ghd7—could enable manipulation of slight differences in day length to control Hd3a transcription with a critical day-length threshold.

Keywords

Authors Jaeger, R. G.

Year 1981 Jaeger RG

Report Name Foraging in optimum light as a niche dimension for neotropical frogs

Publication National Geographic Society Research Reports

Issue-page numbers 13:297-302

URL N/A

Abstract N/A

Keywords

Authors Jaeger, R. G. and J. P. Hailman

Year 1976 Jaeger RG, Hailman JP

Report Name Phototaxis in anurans: relation between intensity and spectral preferences

Publication Copeia

Issue-page numbers 1976:92-98

URL <http://www.jstor.org/pss/1443777>

Abstract In this study we test hypotheses formulated in previous work on anuran phototaxis by examining six heretofore unstudied species and providing more complete data on two previously studied species. We hypothesize that the fundamental adaptive difference among species is the set-point of their optimum ambient illumination (O.A.I.)-the preferred modal intensity in phototactic tests with white light. When intensities of spectrally dominant light are below the species' O.A.I. animals have a blue color-preference, and when intensities are above the O.A.I. animals choose the ends of the spectrum (violet and red) in a preference that cannot be proven to involve true color vision. The new data presented in this study are totally consistent with the hypotheses, which provide a discrete framework for further study of the adaptiveness of phototactic behavior under field conditions.

Keywords

Authors Jaeger, Robert G.; Hailman, Jack P.

Year 1976 Jaeger RG, Hailman JP

Report Name Ontogenetic shift of spectral phototactic preferences in anuran tadpoles

Publication Journal of Comparative and Physiological Psychology

Issue-page numbers Vol 90(10), Oct 1976, 930-945.

URL <http://www.ncbi.nlm.nih.gov/pubmed/1085780>

Abstract Presents data from 2 experiments showing that tadpoles of 3 species of anurans initially had a midspectrum ("green") preference in phototactic tests, which involved a form of true color vision in 1 species and probably in the other 2. During development, the preference shifted to shorter wavelengths until a short-wavelength ("blue") preference predominated in the pre- and postmetamorphic stages and in the adults of 6 species tested. The green preference of young tadpoles appears to be ecologically adaptive, in that it directs larvae to green plants that provide food or shelter. Spectroradiometric field measurements showed that pond illumination in vegetated areas had a more highly saturated yellow-green spectral dominance compared with a desaturated white illumination in open water. During all ontogenetic stages and as adults, Ss preferred high illuminance of white light, which correlated with the high illumination of their habitat. The visual pigments of all 5 types of photoreceptors shifted from vitamin A/2- to vitamin A/1-based chromophores during ontogeny. The resulting shift in spectral response of the receptors might be related to the spectral shift in phototactic preferences.

Keywords

Authors ROBERT G. JAEGER* & JACK P. HAILMAN

Year 1971 Jaeger RG, Hailman JP

Report Name Two Types of Phototactic Behaviour in Anuran Amphibians

Publication Nature

Issue-page numbers 230, 189 - 190 (19 March 1971); doi:10.1038/230189a0

URL <http://www.nature.com/nature/journal/v230/n5290/abs/230189a0.html>

Abstract ARLY studies, such as those of Pearse¹ just after the turn of the century, suggested that anuran amphibians face towards and move to light, particularly light from the portion of the visible spectrum that the human observer sees as blue. Muntz has carried out both behavioural² and physiological³ experiments that suggest this phototactic behaviour in species of the genus *Rana* is a true colour preference, rather than a response based on apparent brightness. Chapman's⁴ experiments confirm this conclusion for *Rana catesbeiana*. Because the functional significance of this "blue preference" is still a matter of speculation, we undertook to study anurans outside the family Ranidae to see if other sorts of preferences exist in anurans. Although this comparative study has only begun, we have discovered a different sort of phototactic behaviour, which we here compare with our own replications of the previous work on *Rana*.

Keywords

Authors Robert G. Jaeger, Jack P. Hailman

Year 1973 Jaeger RG, Hailman JP

Report Name Effects of intensity on the phototactic responses of adult anuran amphibians: a comparative survey

Publication Zeitschrift für Tierpsychologie

Issue-page numbers Volume 33, Issue 3-4, pages 352-407, January-December 1973

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1439-0310.1973.tb02103.x/abstract>

Abstract N/A

Keywords

Authors D. Jamieson and A. Roberts

Year 2000 Jamieson D, Roberts A

Report Name Responses of young *Xenopus laevis* tadpoles to light dimming: possible roles for the pineal eye

Publication Journal of Experimental Biology

Issue-page numbers 203, 1857-1867

URL <http://jeb.biologists.org/content/203/12/1857>

Abstract When the light is dimmed, the pineal eye of hatchling *Xenopus laevis* tadpoles excites the central pattern generator for swimming, but the behavioural significance of pineal excitation is unclear. We show that tadpoles spend 99 % of their time hanging from the surface meniscus or solid objects using mucus secreted by a cement gland on the head. Attachment inhibits swimming, but unattached tadpoles swim spontaneously. Provided that their pineal eye is intact, they attach closer to the water surface in the dark than in the light and attach preferentially to the underside of floating objects that cast shadows. Dimming causes tadpoles swimming horizontally to turn upwards and is very effective in initiating upward swimming in unattached tadpoles. Similar pineal-dependent responses during swimming are present up to stage 44. Pinealectomy blocks responses to dimming at all stages. Recordings from immobilised tadpoles reveal that light dimming induces faster fictive swimming and that pineal activity is increased for up to 20 min during sustained light dimming. We suggest that the increase in pineal discharge during dimming increases the probability of upward swimming and, in this way, increases the probability of tadpoles attaching to objects higher in the water column that cast shadows.

Keywords

Authors Marek Jerzy, Piotr Zakrzewski, Anita Schroeter-Zakrzewska

Year 2011 Jerzy M, Zakrzewski P, Schroeter-Zakrzewska A

Report Name EFFECT OF COLOUR OF LIGHT ON THE OPENING OF INFLORESCENCE BUDS AND POST-HARVEST LONGEVITY OF POT CHRYSANTHEMUMS (*Chrysanthemum x gra*

Publication ACTA AGROBOTANICA

Issue-page numbers Vol. 64 (3): 13–18 2011

URL http://www.ib-pan.krakow.pl/pubs-pdf/Acta%2520Agrobotanica/2011/aa64_c13-18.pdf

Abstract The pot cultivar of *Chrysanthemum x grandiflorum* 'Leticia Time Yellow' was cultivated and stored in a growth room under fluorescent light of white, blue, green, yellow and red colour. Quantum irradiance was 30 $\mu\text{mol} \cdot \text{m}^{-2} \cdot \text{s}^{-1}$. The colour of light exerted a significant influence on the opening of closed inflorescence buds and on post-harvest longevity of pot chrysanthemums grown earlier in an unheated plastic tunnel. Under florescent lamps emitting blue light at a wavelength of 400-580 nm, inflorescence buds opened and coloured the earliest. The number of developed flower heads was the greatest under blue and white light. Flower heads developing in blue light were bigger than flower heads developing in white and green light. In red light at a wavelength of 600-700 nm, plants flowered latest and they produced the smallest flower heads. Post-harvest longevity was preserved longest in chrysanthemums kept under blue, white and green light. In red and yellow light, the flowers were overblown earliest.

Keywords *Chrysanthemum x grandiflorum*, artificial lighting, post-harvest life, pot plants

Authors N.S. Johansen, I. Vänninen, D.M. Pinto, A.I. Nissinen, L. Shipp

Year 2011 Johansen NS, Vänninen I, Pinto DM, et al.

Report Name In the light of new greenhouse technologies: 2. Direct effects of artificial lighting on arthropods and integrated pest management in greenhouse crops

Publication Annals of Applied Biology

Issue-page numbers Volume 159, Issue 1, pages 1–27, July 2011

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7348.2011.00483.x/abstract>

Abstract Novel lighting technology offers the possibility of improved arthropod integrated pest management (IPM) in artificially lighted crops. This review compiles the current knowledge on how greenhouse pest and beneficial arthropods are directly affected by light, with the focus on whiteflies. The effect of ultraviolet depletion on orientation and colour-coded phototaxis are to some extent studied and utilised for control of the flying adult stage of some pest species, but far less is known about the visual ecology of commercially used biological control agents and pollinators, and about how light affects arthropod biology in different life stages. Four approaches for utilisation of artificial light in IPM of whiteflies are suggested: (a) use of attractive visual stimuli incorporated into traps for monitoring and direct control, (b) use of visual stimuli that disrupt the host-detection process, (c) radiation with harmful or inhibitory wavelengths to kill or suppress pest populations and (d) use of time cues to manipulate daily rhythms and photoperiodic responses. Knowledge gaps are identified to design a road map for research on IPM in crops lighted with high-pressure sodium lamps, light-emitting diodes (LEDs) and photosensitive films. LEDs are concluded to offer possibilities for behavioural manipulation of arthropods, but the extent of such possibilities depends in practice on which wavelength combinations are determined to be optimal for plant production. Furthermore, the direct effects of artificial lighting on IPM must be studied in the context of plant-mediated effects of artificial light on arthropods, as both types of manipulations are possible, particularly with LEDs.

Keywords Behaviour; biology; insects; light intensity; mites; photobiology; photoperiod; photoreceptors

Authors Corinne F. Johnson, Christopher S. Brown, Raymond M. Wheeler, John C. Sager, David K. Chapman, Gerald F. Deitzer

Year 1996 Johnson CF, Brown CS, Wheeler RM, et al.

Report Name Infrared light-emitting Diode radiation causes gravitropic and morphological effects in Dark-Grown Oat Seedlings

Publication Photochemistry and Photobiology

Issue-page numbers Volume 63, Issue 2, pages 238–242, February 1996

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1751-1097.1996.tb03020.x/abstract>

Abstract Oat (*Avena sativa* cv Seger) seedlings were irradiated with IR light-emitting diode (LED) radiation passed through a visible-light-blocking filter. Infrared LED irradiated seedlings exhibited differences in growth and gravitropic response when compared to seedlings grown in darkness at the same temperature. Thus, the oat seedlings in this study were able to detect IR LED radiation. These findings call into question the use of IR LED as a safe-light for some photosensitive plant response experiments. These findings also expand the defined range of wavelengths involved in radiation-gravity (light-gravity) interactions to include wavelengths in the IR region of the spectrum.

Keywords Johnson CF, Brown CS, Wheeler RM, et al.

Authors Joshi BN, Udaykumar K

Year 2000 Joshi BN, Udaykumar K

Report Name Melatonin counteracts the stimulatory effects of blinding or exposure to red light on reproduction in the skipper frog *Rana cyanophlyctis*

Publication General and Comparative Endocrinology

Issue-page numbers (April 2000), 118 (1), pg. 90-95

URL http://journals1.scholarsportal.info/details.xqy?uri=/00166480/v118i0001/90_mctseoitsfrc.xml

Abstract An earlier study reported that blinding or exposure to red light stimulates reproduction in *R. cyanophlyctis*. The present study investigates whether melatonin counteracted blinding- or red-light-induced ovarian stimulation. The study consisted of two experiments carried out during the prebreeding (March/April) and breeding phase (August/September) of the reproductive cycle of this species. In experiment 1, exposure to red light for 30 days increased ($P < 0.01$) the gonadosomatic index (GSI) and oviductal weights, whereas exposure to continuous darkness for the same duration decreased ($P < 0.01$) the GSI. Data on follicular kinetics revealed an increase in vitellogenic oocytes and decrease in previtellogenic oocyte numbers following exposure to red lights. Exposure to continuous dark on the other hand increased previtellogenic oocyte and decreased vitellogenic oocyte numbers. In experiment 2, the GSI and the number of vitellogenic oocytes increased in blinded and red-light-exposed frogs. However, treatment with melatonin (15 μg sc) for 30 days to both these groups of frogs reduced the GSI, oviductal weights, and the number of vitellogenic oocytes. The results both confirm earlier finding that blinding and exposure to red light stimulate ovarian growth and also demonstrate that melatonin counteracts blinding or red-light-induced stimulation of ovarian activity. This apart, the findings from experiment 1 demonstrate for the first time that exposure to continuous dark inhibits ovarian growth in this species. Ocular melatonin seems to play an important role in regulation of reproduction in this species.

Keywords

Authors Jon-Erik Juell, Jan Erik Fosseidengen

Year 2004 Juell J, Fosseidengen JE

Report Name Use of artificial light to control swimming depth and fish density of Atlantic salmon (*Salmo salar*) in production cages

Publication Aquaculture

Issue-page numbers Volume 233, Issues 1-4, 26 April 2004, Pages 269-282

URL <http://www.sciencedirect.com/science/article/pii/S0044848603007294>

Abstract The swimming behaviour of caged Atlantic salmon (*Salmo salar*) is influenced by both natural and artificial light conditions. This study reports the effects of light regimes and the positioning of lamps on swimming depth and fish density in groups of 170–230,000 Atlantic salmon (0.2–0.7 kg) held in 25-m-deep production cages (17,500 m³). Echo integration was used to estimate swimming depth and fish density as kilograms per cubic meter (observed fish density) and number of fish per cubic meter (packing density). In February, April and June, salmon groups swam consistently deeper and at lower density, both day and night, in cages illuminated by lamps at a depth of 15 m than in cages with lamps at 3 m. The packing density within treatments showed little variation across seasons, suggesting that interindividual distance was not size related. When subjected to short-term changes in light regimes, in January and March, the physostome salmon demonstrated a high degree of flexibility in vertical positioning. When underwater lamps were lowered from 1 to 15 m and subsequently raised again during a period of 48 h, swimming depth correlated with lamp depth. Both natural photoperiod and 24 L:0 D with lamps mounted above the surface resulted in the fish crowding near the surface at night. The results suggest that artificial light intensity gradients may be used to reduce exposure to suboptimal water layers and crowding of fish.

Keywords *Salmo salar* L.; Light; Fish density; Swimming depth; Welfare

Authors Deepak Kagate

Year 2012 Kagate D

Report Name Wireless Streetlight Control System

Publication International Journal of Computer Applications

Issue-page numbers Volume 41– No.2, March 2012

URL <http://research.ijcaonline.org/volume41/number2/pxc3877500.pdf>

Abstract This paper describes the use of wireless sensor network for streetlight monitoring and control. As we look at existing systems the power consumption and maintenance cost of streetlight control department is high. This system would provide an optimal costing for streetlight maintenance and control. System employed use of network processing device (nodes) for sensing of light and then gathered information is used for controlling streetlight ON/OFF or streetlight intensity. Life of Street Lamps depends on the duration for which they get used. In this research, I will try to reduce the required duration for which lamp should be ON, focuses on increasing frequency band for network nodes to get maximum possible data rate and also discuss the parameters required to automatic detection and removal of nodes in the network. This paper also discusses the cost comparison between current system, sensor control system and this system with profile implementation.

Keywords

Authors Ichirou Karahara, Eiko Takaya, Shigetaka Fujibayashi, Hiroshi Inoue, James L. Weller, James B. Reid and Michizo Sugai

Year 2011 Karahara I, Takaya E, Fujibayashi S, et al.

Report Name Development of the Casparian strip is delayed by blue light in pea stems

Publication Planta

Issue-page numbers Volume 234, Number 5, 1019-1030, DOI: 10.1007/s00425-011-1451-7

URL <http://www.springerlink.com/content/km288v10382x5591/>

Abstract To understand the regulatory mechanisms involved in tissue development by light, the kinetics of regulation of Casparian strip (CS) development in garden pea stems was studied. We found that short-term irradiation with white light delayed the development of the CS and used this delay to assess the quantitative effect of light on CS development. We examined the effect of the duration and fluence rates of white light treatment on CS development and observed a significant relationship between fluence and the delay in CS development indicating that the Bunsen–Roscoe law of reciprocity holds for this response. The effect of white light irradiation was not inhibited in the presence of a photosynthetic inhibitor, DCMU, or a carotenoid biosynthesis inhibitor, Norflurazon, indicating that the delay in CS development by light is a photomorphogenetic response rather than a subsidiary effect mediated by photosynthetic activity. An action spectrum for the response displayed a major peak in the blue-light region, suggesting a dominant role for blue-light receptors. A minor peak in the red-light region also suggested the possible involvement of phytochromes. Although phytochromes are known to contribute to blue-light responses, phytochrome-deficient mutants showed a normal delay of CS development in response to blue light, indicating that the response is not mediated by phytochrome and suggesting a role for one or more specific blue-light receptors.

Keywords Action spectrum – Blue light – Endodermis – Photomorphogenesis – *Pisum sativum* L. cv. Alaska – Stem Casparian strip

Authors Divya Karnad, Kavita Isvaran, Chandrasekhar S. Kar, Kartik Shanker

Year 2009 Karnad D, Isvaran K, Kar CS, Shanker K

Report Name Lighting the way: Towards reducing misorientation of olive ridley hatchlings due to artificial lighting at Rushikulya, India

Publication Biological Conservation

Issue-page numbers Volume 142, Issue 10, October 2009, Pages 2083-2088

URL <http://www.sciencedirect.com/science/article/pii/S0006320709001748>

Abstract Sea-finding behavior in sea turtle hatchlings is modified by the visual cues provided by artificial beach front lighting. The consequent landward movement of hatchlings in response to coastal electric lighting reduces their survival rates. We assessed the potential impact of coastal lighting at Rushikulya, an important mass nesting site of the olive ridley sea turtle (*Lepidochelys olivacea*) in the Indian Ocean region. We examined the response of hatchlings to light characteristics in an experimental setup, as well as to the existing lighting regimes along the beach, using arena trials. Previous studies on other species indicate preferential orientation towards low wavelength and high intensity light. Our study confirms these preferences among hatchlings from the Indian Ocean population of olive ridleys. In addition we also found that wavelength and intensity could have an interactive effect upon hatchling orientation. Hatchlings at the study site respond both to visible point sources of light and to sheer glows of light. Though beach plantations of introduced *Casuarina equisetifolia* are generally considered to have negative impacts on sea turtle nesting beaches, we found that they acted as an effective light barrier when planted about 50 m away from the high tide line. We developed a model of the expected impact of artificial lighting on hatchling orientation during mass hatching events of previous years, and predict as much as 50% misorientation in some years. We also developed a map representing the misorientation of hatchlings due to artificial lighting based on arena trials in different regions of the beach. The results of the study helped identify focal areas for light management on the beach, which could be critical for the survival of this population.

Keywords *Casuarina equisetifolia*; Intensity; *Lepidochelys olivacea*; Light barrier; Sea-finding; Wavelength

Authors Divya Karnad, Kavita Isvaran, Chandrasekhar S. Kar, Kartik Shanker

Year 2009 Karnad D, Isvaran K, Kar CS, Shanker K

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Abstract Sea-finding behavior in sea turtle hatchlings is modified by the visual cues provided by artificial beach front lighting. The consequent landward movement of hatchlings in response to coastal electric lighting reduces their survival rates. We assessed the potential impact of coastal lighting at Rushikulya, an important mass nesting site of the olive ridley sea turtle (*Lepidochelys olivacea*) in the Indian Ocean region. We examined the response of hatchlings to light characteristics in an experimental setup, as well as to the existing lighting regimes along the beach, using arena trials. Previous studies on other species indicate preferential orientation towards low wavelength and high intensity light. Our study confirms these preferences among hatchlings from the Indian Ocean population of olive ridleys. In addition we also found that wavelength and intensity could have an interactive effect upon hatchling orientation. Hatchlings at the study site respond both to visible point sources of light and to sheer glows of light. Though beach plantations of introduced *Casuarina equisetifolia* are generally considered to have negative impacts on sea turtle nesting beaches, we found that they acted as an effective light barrier when planted about 50 m away from the high tide line. We developed a model of the expected impact of artificial lighting on hatchling orientation during mass hatching events of previous years, and predict as much as 50% misorientation in some years. We also developed a map representing the misorientation of hatchlings due to artificial lighting based on arena trials in different regions of the beach. The results of the study helped identify focal areas for light management on the beach, which could be critical for the survival of this population.

Keywords *Casuarina equisetifolia*; Intensity; *Lepidochelys olivacea*; Light barrier; Sea-finding; Wavelength

Authors Bart Kempnaers, Pernilla Borgström, Peter Loës, Emmi Schlicht, Mihai Valcu

Year 2010 Kempnaers B, Borgström P, Loës P, et al.

Report Name Artificial Night Lighting Affects Dawn Song, Extra-Pair Siring Success, and Lay Date in Songbirds

Publication Current Biology

Issue-page numbers Volume 20, Issue 19, 12 October 2010, Pages 1735-1739

URL <http://www.sciencedirect.com/science/article/pii/S0960982210010183>

Abstract Associated with a continued global increase in urbanization [1], anthropogenic light pollution is an important problem [2]. However, our understanding of the ecological consequences of light pollution is limited [2], [3] and [4]. We investigated effects of artificial night lighting on dawn song in five common forest-breeding songbirds. In four species, males near street lights started singing significantly earlier at dawn than males elsewhere in the forest, and this effect was stronger in naturally earlier-singing species. We compared reproductive behavior of blue tits breeding in edge territories with and without street lights to that of blue tits breeding in central territories over a 7 year period. Under the influence of street lights, females started egg laying on average 1.5 days earlier. Males occupying edge territories with street lights were twice as successful in obtaining extra-pair mates than their close neighbors or than males occupying central forest territories. Artificial night lighting affected both age classes but had a stronger effect on yearling males. Our findings indicate that light pollution has substantial effects on the timing of reproductive behavior and on individual mating patterns. It may have important evolutionary consequences by changing the information embedded in previously reliable quality-indicator traits [5] and [6].

Keywords

Authors Kemper, C.A.
Year 1964 Kemper CA
Report Name A tower for TV, 30.000 dead birds
Publication Audubon Magazine
Issue-page numbers 66, 89-90
URL N/A
Abstract N/A
Keywords

Authors Kicliter E, Goytia EJ.
Year 1995 Kicliter E, Goytia EJ
Report Name A comparison of spectral response functions of positive and negative phototaxis in two anuran amphibians, Rana pipiens and Leptodactylus pentadactylus
Publication Neurosci Lett
Issue-page numbers Feb 9;185(2):144-6.
URL <http://www.ncbi.nlm.nih.gov/pubmed/7746507>
Abstract Anuran (tailless) amphibians exhibit preferences for light; some species (photopositive) are attracted to light while others (photonegative) are repelled. The photopositive anuran Rana pipiens and the photonegative anuran Leptodactylus pentadactylus were tested in a Y-maze on a light versus dark task where the 'light' stimuli were monochromatic and equated for energy. During each trial the window in one of the choice alleys of the Y-maze was illuminated while the window in the other was dark. Photopositive behavior was defined as greater than 50% choice of the alley with the illuminated stimulus, while photonegative behavior was defined as less than 50% choice. Based on previously reported spectral response functions, it was expected that the photonegative species (L. pentadactylus) would exhibit a maximum photonegativity in the 490-570 nm range while the photopositive species (R. pipiens) would be most strongly attracted by short wavelengths. However, our results indicate that both species are affected most strongly by short wavelength light; only the sign of the response (repulsion versus attraction) is inverted for L. pentadactylus, the photonegative species. This suggests that the retinal circuitry for wavelength discrimination may be equivalent in photopositive and photonegative anurans.
Keywords

Authors Katrine Heinsvig Kjaer and Carl-Otto Ottosen

Year 2011 Kjaer KH, Ottosen C

Report Name Growth of Chrysanthemum in Response to Supplemental Light Provided by Irregular Light Breaks during the Night

Publication JASHS

Issue-page numbers January 2011 vol. 136 no. 1 3-9

URL <http://journal.ashspublications.org/content/136/1/3.abstract>

Abstract Circadian rhythms are believed to be of great importance to plant growth and performance under fluctuating climate conditions. However, it is unclear how plants with a functioning circadian clock will respond to irregular light environments that disturb circadian-regulated parameters related to growth. Chrysanthemum (*Chrysanthemum morifolium* 'Coral Charm') was exposed to supplemental light provided as irregular light breaks during the night, achieved by controlling the light based on forecasted solar irradiance and electricity prices. Growth, in terms of carbon gain, was linearly correlated to both daylength and daily light integral. This response was observed irrespective of the irregularity of the light breaks and despite circadian-regulated processes of carbohydrate metabolism, chlorophyll fluorescence, and leaf chlorophyll content being affected. Leaf expansion and stem elongation occurred at a faster rate in plants grown in short days with irregular light breaks during the night period compared with plants grown in a climate with a consecutive long light period, showing that low average light intensity promoted expansion of the photosynthetic area of the plants. These results are important to gain an understanding of the relationship between circadian-regulated processes and plant growth. These results will also contribute to increased energy savings in the use of supplemental light in greenhouse production.

Keywords circadian rhythm, leaf expansion, stem elongation

Authors J H Klotz, B L Reid

Year 1993 Klotz JH, Reid BL

Report Name Nocturnal orientation in the black carpenter ant *Camponotus pennsylvanicus* (DeGeer) (Hymenoptera: Formicidae)

Publication Insectes Sociaux

Issue-page numbers Volume: 40, Pages: 95-106

URL <http://www.mendeley.com/research/nocturnal-orientation-black-carpenter-ant-camponotus-pennsylvanicus-degeer-hymenoptera-formicidae/>

Abstract The black carpenter ant *Camponotus pennsylvanicus* (DeGeer), a predominantly nocturnal formicine ant, responds to a hierarchy of visual and tactile cues when orienting along odor trails at night. Under illumination from moonlight or artificial light, workers rely upon these beacons to mediate phototactic orientation. In the absence of moonlight or artificial lights, ants were able to orient visually to terrestrial landmarks. In the absence of all landmarks, save for overhanging tree branches, ants could negotiate shortcuts or make directional changes in response to visual landmarks presented within the tree canopy on a moonless night. When experimental manipulations place the ants in total darkness, they could no longer negotiate shortcuts and would resort to thigmotactic orientation along structural guidelines to reach a food source. The hierarchical organization of these diverse cues in a foraging strategy is discussed, as well as their adaptive significance to *C. pennsylvanicus*.

Keywords

Authors Torsten Knauer, Michaela Dümmer, Frank Landgraf and Christoph Forreiter

Year 2011 Knauer T, Dümmer M, Landgraf F, Forreiter C

Report Name A Negative Effector of Blue Light-Induced and Gravitropic Bending in Arabidopsis

Publication Plant Physiology

Issue-page numbers May 2011 vol. 156 no. 1 439-447

URL <http://www.plantphysiol.org/content/156/1/439.short>

Abstract Although sessile, plants are able to grow toward or away from an environmental stimulus. Important examples are stem or leaf orientation of higher plants in response to the direction of the incident light. The responsible photoreceptors belong to the phototropin photoreceptor family. Although the mode of phototropin action is quite well understood, much less is known of how the light signal is transformed into a bending response. Several lines of evidence indicate that a lateral auxin gradient is responsible for asymmetric cell elongation along the light gradient within the stem. However, some of the molecular key players leading to this asymmetric auxin distribution are, as yet, unidentified. Previously, it was shown that phototropin gets autophosphorylated upon illumination and binds to a scaffold protein termed NPH3 (for nonphototropic hypocotyl 3). Using a yeast three-hybrid approach with phototropin and NPH3 as a bait complex, we isolated a protein, termed EHB1 (for enhanced bending 1), with a so far unknown function, which binds to this binary complex. This novel interacting factor negatively affects hypocotyl bending under blue light conditions in Arabidopsis (*Arabidopsis thaliana*) and thus seems to be an important component regulating phototropism. Interestingly, it could be shown that the gravitropic response was also affected. Thus, it cannot be ruled out that this protein might also have a more general role in auxin-mediated bending toward an environmental stimulus.

Keywords

Authors Kochevar, Randall E.

Year 1998 Kochevar RE

Report Name Effects of Artificial Light on Deep Sea Organisms: Recommendations for ongoing use of artificial lights on deep sea submersibles

Publication Technical Report to the Monterey Bay National Marine Sanctuary Research Activity Panel

Issue-page numbers January, 1998

URL <http://montereybay.noaa.gov/research/techreports/trkochevar.html>

Abstract The natural optic environment of the deep oceans consists of very dim, homochromatic, downwelling light, supplemented by animal bioluminescence. Most organisms inhabiting this environment possess highly specialized visual systems, which are sensitive to the small amount of light that is there. The sensitive nature of these visual systems might make such organisms vulnerable to damage from exposure to bright artificial lights of submersible vehicles. This document will outline the current state of knowledge on effects of artificial light on vision in deep sea animals; assess (where possible) the likely impact of routine submersible operations on animal communities; and offer suggestions for future research aimed at addressing the impacts of submersible use on visual organisms.

Keywords

Authors	Miroslav Kocifaj
Year	2012 Kocifaj M
Report Name	Two-stream approximation for rapid modeling the light pollution levels in local atmosphere
Publication	Astrophysics and Space Science
Issue-page numbers	2012, DOI: 10.1007/s10509-012-1074-x
URL	http://www.springerlink.com/content/c841n3j7pp0t0585/
Abstract	The two-stream concept is used for modeling the radiative transfer in Earth's atmosphere illuminated by ground-based light sources. The light pollution levels (illuminance and irradiance) are computed for various aerosol microphysical parameters, specifically the asymmetry parameter g_A , single scattering albedo ω_A , and optical thickness τ_A . Two distinct size distributions of Junge's and gamma-type are employed. Rather than being a monotonic function of τ_A , the diffuse illuminance/irradiance shows a local minimum at specific τ_A , independent of size distribution taken into consideration. The existence of local minima has relation to the scattering and attenuation efficiencies both of which have opposite effects. The computational scheme introduced in this paper is advantageous especially if the entire set of calculations needs to be repeated with an aim to simulate diffuse light in various situations and when altering optical states of the atmospheric environment.
Keywords	Light pollution – Atmospheric effects – Methods: numerical – Radiative transfer – Scattering

Authors	D Kolligs
Year	2000 Kolligs D
Report Name	Ecological effects of artificial light sources on nocturnally active insects, in particular on butterflies (Lepidoptera)
Publication	Faunistisch-Oecologische Mitteilungen Supplement
Issue-page numbers	28:1-136
URL	N/A

Abstract

It is a well known phenomena that night-active insects are attracted by artificial light sources. With a growing urban environment and a high number of street lamps and other light emitting sources, the response of night active insects to artificial light becomes of in-creasing importance for nature protection. This study focuses on the behavioural response of different insect orders, families and species to the most frequently used exterior lighting and street lamps (mercury- and sodium-vapour lamps). These artificial sources of light distinctly increased in the last decades. In the city of Kiel (North-Germany) the number of streetlights was fifty times higher in 1998 than in 1949. The investigations were carried out at two sites in Schleswig-Holstein (North-Germany): in Albersdorf / Dithmarschen (western Schleswig-Holstein) and in Kiel on the university campus (eastern Schleswig-Holstein). In Albersdorf, the insects were attracted by a light emitting greenhouse (10,000 m²) and by two punctually radiating light sources (light traps with mercury and sodium-vapour lamps) and became comparative investigated in 1994 to 1995. Two different methods were used to record insects at the greenhouse. Butterflies (Lepidoptera) were sampled by hand. The remaining insects were trapped in two 1.5 m² large sample areas using a suction trap. Insects from each of the four sides of the green-house were sampled and trapped separately. The two light traps caught the insects automatically. On the campus of Kiel University insects were studied from 1994 to 1996. For this purpose four street lamps equipped with mercury-vapour lamps had traps attached to the socket. On one of the four street lamps the mercury-vapour lamp was exchanged by a sodium-vapour lamp with the same light intensity. In 1996 two additional street lamps were equipped with a different type of trap. 72,267 insects from 114 insect families and 96,725 insects from 138 families were recorded at Albersdorf and at Kiel, respectively. Butterflies (Lepidoptera), beetles (Coleoptera), caddis flies (Trichoptera) and sciarid flies (Sciaridae) were determined to the species level. An analysis of the catches gave the following results: Mosquitos (Nematocera) made up the majority of all captured insects (40 - 90 %). The other most common groups were butterflies (Lepidoptera), flies (Brachycera) and beetles (Coleoptera). In both study areas Hymenopterans (Hymenoptera), aphids (Aphidina), cicadas (Cicadina), true bugs (Heteroptera), neuropterans (Neuroptera), caddis flies (Trichoptera), psocids (Psocoptera) and mayflies (Ephemeroptera) made up less than 1 % of the total catch. Catches from adjacent street lamps (25 m apart) were distinctly different in their insect compositions. These differences seem to be caused by the surrounding habitats and the wind exposure of the lamps. Significant differences between the compositions of samples from different street lamps were only found between May and the end of August. In spring and autumn the sample sizes were small and species compositions were not significantly different. In contrast to hand sampling not all insects that flew into street lamps were caught by the automatic light traps (e. g. only 30-40 % of the Lepidoptera were caught by the traps) No significant correlation was found between the size of a light source and the number of Lepidoptera attracted by it. Rather the intensity and the light spectrum seem to control butterfly abundance at a light source. The light spectrum of the sodium-vapour lamp attracted fewer species and individuals than the mercury-vapour lamp. Otherwise from some species, e.g. the swift moths (Hepialidae) or the geometric moth *Idaea dimidiata*, more individuals were registered at the sodium-vapour lamps. Only single individuals of endangered butterfly species were found at the different light sources, while 31 beetle species of the Red List of Schleswig-Holstein were captured in the study area in Kiel.

Keywords

Authors Korkosh, V. V.

Year 1992 Korkosh V V

Report Name Behavior of Atlantic saury and features of its response to light

Publication Voprosy Ikhtiologii

Issue-page numbers 32(4):132-137

URL N/A

Abstract The behavior of Atlantic saury was studied in an artificial light environment. It is found that the response of the fish to light varies during the year and is determined by biological and ecological factors. The effectiveness of attraction of the fish to light depends on the power and spectral characteristics of light sources. A suggestion is made to use xenon bulbs DKST-20,000. It is established that attraction to light in Atlantic saury is based on the food procurement factor.

Keywords

Authors György Kriska, Balázs Bernáth, Róbert Farkas, Gábor Horváth

Year 2009 Kriska G, Bernáth B, Farkas R, Horváth G

Report Name Degrees of polarization of reflected light eliciting polarotaxis in dragonflies (Odonata), mayflies (Ephemeroptera) and tabanid flies (Tabanidae)

Publication Journal of Insect Physiology

Issue-page numbers Volume 55, Issue 12, December 2009, Pages 1167-1173

URL <http://www.sciencedirect.com/science/article/pii/S0022191009002996>

Abstract With few exceptions insects whose larvae develop in freshwater possess positive polarotaxis, i.e., are attracted to sources of horizontally polarized light, because they detect water by means of the horizontal polarization of light reflected from the water surface. These insects can be deceived by artificial surfaces (e.g. oil lakes, asphalt roads, black plastic sheets, dark-coloured cars, black gravestones, dark glass surfaces, solar panels) reflecting highly and horizontally polarized light. Apart from the surface characteristics, the extent of such a 'polarized light pollution' depends on the illumination conditions, direction of view, and the threshold p^* of polarization sensitivity of a given aquatic insect species. p^* means the minimum degree of linear polarization p of reflected light that can elicit positive polarotaxis from a given insect species. Earlier there were no quantitative data on p^* in aquatic insects. The aim of this work is to provide such data. Using imaging polarimetry in the red, green and blue parts of the spectrum, in multiple-choice field experiments we measured the threshold p^* of ventral polarization sensitivity in mayflies, dragonflies and tabanid flies, the positive polarotaxis of which has been shown earlier. In the blue (450 nm) spectral range, for example, we obtained the following thresholds: dragonflies: *Enallagma cyathigerum* ($0\% < p^* \leq 17\%$), *Ischnura elegans* ($17\% \leq p^* \leq 24\%$). Mayflies: *Baetis rhodani* ($32\% \leq p^* \leq 55\%$), *Ephemera danica*, *Epeorus silvicola*, *Rhithrogena semicolorata* ($55\% \leq p^* \leq 92\%$). Tabanids: *Tabanus bovinus*, *Tabanus tergustinus* ($32\% \leq p^* \leq 55\%$), *Tabanus maculicornis* ($55\% \leq p^* \leq 92\%$).

Keywords Mayfly; Ephemeroptera; Dragonfly; Odonata; Tabanid fly; Tabanidae; Polarization vision; Polarotaxis; Threshold of polarization sensitivity

Authors Atsushi KUNIHURO, Takafumi YAMASHINO and Takeshi MIZUNO

Year 2010 Kunihiro A, Yamashino T, Mizuno T

Report Name PHYTOCHROME-INTERACTING FACTORS PIF4 and PIF5 Are Implicated in the Regulation of Hypocotyl Elongation in Response to Blue Light in Arabidopsis thaliana

Publication Bioscience, Biotechnology, and Biochemistry

Issue-page numbers Vol. 74 (2010) , No. 12 pp.2538-2541

URL http://www.jstage.jst.go.jp/article/bbb/74/12/74_2538/_article

Abstract In Arabidopsis thaliana, plant growth, including elongation of hypocotyl is regulated in response to light conditions through circadian clock-controlled PHYTOCHROME-INTERACTING FACTORS PIF4 and PIF5. In this study, we found that these transcription factors were responsible not only for red light signaling through the phytochromes but also for blue light signaling in the photomorphogenic control of hypocotyl elongation. It is possible that plant hormone gibberellins play an important role in blue light signaling in part through PIF4/PIF5.

Keywords Arabidopsis thaliana; circadian clock; light signaling; photoperiodic control of hypocotyl elongation

Authors Sookyoun Kwon and Jaehyun Lim

Year 2011 Kwon S, Lim J

Report Name Improvement of Energy Efficiency in Plant Factories through the Measurement of Plant Bioelectrical Potential

Publication Informatics in Control, Automation and Robotics

Issue-page numbers Lecture Notes in Electrical Engineering, 2011, Volume 132, 641-648, DOI: 10.1007/978-3-642-25899-2_86

URL <http://www.springerlink.com/content/g132227243307537/>

Abstract To create the best environment for plant growth, research is needed to resolve the economic challenges faced by plant factories using methods such as energy-efficient artificial lighting and light control technology. Plants react sensitively to environmental changes in temperature, humidity, and carbon dioxide, and to changes in the wavelength and intensity of light. Among these environmental factors, light is essential for photosynthesis. Therefore, to promote plant growth and improve energy savings in plant factories, we need a better understanding of the appropriate light wavelength and the PPFD (Photosynthetic Photon Flux Density) required by each type of plant. In this paper, a system has been designed to measure and analyze the plant bioelectrical potential which differs depending on the type of plant and the lighting conditions. This experiment identifies the optimal lighting environment for different types of plants through a comparative analysis process of growth rate and energy consumption.

Keywords

Authors Christopher C. M. Kyba, Thomas Ruhtz, Jürgen Fischer, Franz Hölker

Year 2011 Kyba CCM, Ruhtz T, Fischer J, Hölker F

Report Name Cloud Coverage Acts as an Amplifier for Ecological Light Pollution in Urban Ecosystems

Publication PLoS ONE

Issue-page numbers 6(3): e17307. doi:10.1371/journal.pone.0017307

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0017307>

Abstract The diurnal cycle of light and dark is one of the strongest environmental factors for life on Earth. Many species in both terrestrial and aquatic ecosystems use the level of ambient light to regulate their metabolism, growth, and behavior. The sky glow caused by artificial lighting from urban areas disrupts this natural cycle, and has been shown to impact the behavior of organisms, even many kilometers away from the light sources. It could be hypothesized that factors that increase the luminance of the sky amplify the degree of this “ecological light pollution”. We show that cloud coverage dramatically amplifies the sky luminance, by a factor of 10.1 for one location inside of Berlin and by a factor of 2.8 at 32 km from the city center. We also show that inside of the city overcast nights are brighter than clear rural moonlit nights, by a factor of 4.1. These results have important implications for chronobiological and chronoecological studies in urban areas, where this amplification effect has previously not been considered.

Keywords

Authors Christopher Conrad Maximilian Kyba, Thomas Ruhtz, Juergen Fischer, Franz Hölker

Year 2011 Kyba CCM, Ruhtz T, Fischer J, Hölker F

Report Name Lunar skylight polarization signal polluted by urban lighting

Publication Journal of Geophysical Research

Issue-page numbers in press 2011; DOI: 10.1029/2011JD016698

URL <http://www.agu.org/pubs/crossref/pip/2011JD016698.shtml>

Abstract On clear moonlit nights, a band of highly polarized light stretches across the sky at a 90 degree angle from the moon, and it was recently demonstrated that nocturnal organisms are able to navigate based on it. Urban skyglow is believed to be almost unpolarized, and is therefore expected to dilute this unique partially linearly polarized signal. We found that urban skyglow has a greater than expected degree of linear polarization ($p=8.6$ {plus minus} 0.3%), and confirmed that its presence diminishes the natural lunar polarization signal. We also observe that the degree of linear polarization can be reduced as the moon rises, due to the misalignment between the polarization angles of the skyglow and scattered moonlight. Under near ideal observing conditions, we found that the lunar polarization signal was clearly visible ($p=29.2$ {plus minus} 0.8%) at a site with minimal light pollution 28 km from Berlin's center, but was reduced ($p=11.3$ {plus minus} 0.3%) within the city itself. Daytime measurements indicate that without skyglow p would likely be in excess of 50%. These results indicate that nocturnal animal navigation systems based on perceiving polarized scattered moonlight likely fail to operate properly in highly light-polluted areas, and that future light pollution models must take polarization into account.

Keywords aeroecology, ecological light pollution, light pollution, moonlight, nocturnal navigation, polarized light

Authors Justyna Łabuz, Olga Sztatelman, Agnieszka Katarzyna Banaś and Halina Gabryś

Year 2012 Łabuz J, Sztatelman O, Banaś AK, Gabryś H

Report Name The expression of phototropins in Arabidopsis leaves: developmental and light regulation

Publication J. Exp. Bot.

Issue-page numbers 63 (4): 1763-1771. doi: 10.1093/jxb/ers061

URL <http://jxb.oxfordjournals.org/content/63/4/1763.short>

Abstract Phototropins are blue light receptors, which play different roles during plant development. Two phototropins of Arabidopsis thaliana, phot1 and phot2, have strongly overlapping functions. In seedlings, both photoreceptors are responsible for phototropism. In mature leaves they redundantly regulate leaf shape, stomatal opening, and the accumulation of chloroplasts, whereas phototropin2 alone controls chloroplast avoidance response. Light not only activates phototropins, but also affects the level of their expression. In Arabidopsis seedlings, PHOT1 is downregulated and PHOT2 is upregulated by light. Since data on transcription levels of phototropins in mature Arabidopsis leaves is scarce, a comprehensive real-time PCR study of PHOT1 and PHOT2 expression during development was performed, from seedlings to senescing leaves. So far, neither the phototropin expression nor its modulation by light have been investigated during senescence. The results show that the general regulation pattern remains conserved during Arabidopsis lifecycle, whereas the level of transcripts fluctuates over time, pointing to the significance of the light control for functioning of phototropins. The second part of the study determined the influence of photosynthesis-derived signals and photoreceptor-activated transduction pathways on phototropin mRNA levels. The effects of blue and red light were examined using Arabidopsis mutant lines deficient in photoreceptors. The results reveal a complex network of interactions between these receptors in the regulation of phototropin transcription profiles. Cryptochrome1 and phytochromeB appear to be main photoreceptors involved in the regulation of PHOT1 transcript accumulation. The expression of PHOT2 is dependent on both cryptochromes and phytochromeA.

Keywords blue light, gene expression, photoreceptor, phototropin, white light

Authors Lambert, K.

Year 1988 Lambert K

Report Name Nocturnal migration activity of seabirds in the Gulf of Guinea

Publication Beitrage zur Vogelkunde

Issue-page numbers 34(1): 29-35

URL N/A

Abstract The employment of strong light sources aboard of a ship in the Gulf of Guinea in April 1986 allowed insights into the nocturnal migration activity of many seabird-species. Procellariiformes reacted under all weather conditions equally and insignificantly upon the light whereas distant-migrating northern migrants were distinctly stronger attracted in nights with rain and thunderstorm. Most frequent species were Sterna paradisaea, Phalaropus fulicarius and Xema sabini, rarer were Stercorariidae, other Sternidae and others. For Xema and Stercorarius these are the first true records of nocturnal migration. By all these species the daytime was chiefly used for resting and feeding. Sterna fuscata, a tropical species, showed a high daily but a low nocturnal activity.

Keywords

Authors Alexander B Lang, Elisabeth K V Kalko, Heinrich Römer, Cecile Bockholdt, Dina K N Dechmann

Year 2006 Lang AB, Kalko EKV, Römer H, et al.

Report Name Activity levels of bats and katydids in relation to the lunar cycle

Publication Oecologia

Issue-page numbers Volume: 146, Issue: 4, Publisher: Springer, Pages: 659-666

URL <http://www.mendeley.com/research/activity-levels-of-bats-and-katydid-in-relation-to-the-lunar-cycle/>

Abstract Animals are exposed to many conflicting ecological pressures, and the effect of one may often obscure that of another. A likely example of this is the so-called "lunar phobia" or reduced activity of bats during full moon. The main reason for lunar phobia was thought to be that bats adjust their activity to avoid predators. However, bats can be prey, but many are carnivorous and therefore predators themselves. Thus, they are likely to be influenced by prey availability as well as predation risk. We investigated the activity patterns of the perch-hunting *Lophostoma silvicolum* and one of its main types of prey, katydids, to assess the influence of the former during different phases of the lunar cycle on a gleaning insectivorous bat. To avoid sampling bias, we used sound recordings and two different capture methods for the katydids, as well as video monitoring and radio-telemetry for the bats. Both, bats and katydids were significantly more active during the dark periods associated with new moon compared to bright periods around the full moon. We conclude that foraging activity of *L. silvicolum* is probably influenced by prey availability to a large extent and argue that generally the causes of lunar phobia are species-specific.

Keywords

Authors M Larinier, S Boyerbernard

Year 1991 Larinier M, Boyerbernard S

Report Name Downstream migration of smolts and effectiveness of a fish bypass structure at Halsou Hydroelectric Powerhouse on the Nive River

Publication Bulletin Francais De La Peche Et De La Pisciculture

Issue-page numbers Issue: 321, Pages: 72-92

URL <http://www.mendeley.com/research/downstream-migration-smolts-effectiveness-fish-bypass-structure-halsou-hydroelectric-powerhouse-nive-river/>

Abstract Downstream migration of Atlantic salmon (*Salmo salar*) smolts in river Nive South-West West France was studied in 1987 and 1988 to access the effectiveness of a fish bypass structure at the hydroelectric plant of Halsou. Passage of fish was determined by trapping and video recording. Daily, diurnal and hourly passages at bypass were determined. Tests with marked fish showed between 42% and 95% of the smolts used the surface bypass. Significantly more smolts were bypassed when the discharge was increased. Exploratory tests with halogen and mercury lights were performed. Visual observation indicated that fish was attracted to the lights but avoided the point source : results showed an increased rate of passage when the lamps lighting up the bypass were turned off.

Keywords

Authors M Larinier, S Boyerbernard

Year 1991 Larinier M, Boyerbernard S

Report Name Smolts downstream migration at Poutes Dam on the Allier River: Use of mercury lights to increase the efficiency of a fish bypass structure

Publication Bulletin Francais De La Peche Et De La Pisciculture

Issue-page numbers Issue: 323, Pages: 129-148

URL <http://www.mendeley.com/research/smolts-downstream-migration-poutesdam-allier-river-mercury-lights-increase-efficiency-fish-bypass-structure/>

Abstract Downstream migration of Atlantic salmon (*Salmo salar*) smolts was studied in 1989 at Poutes dam on the Allier river to evaluate the effectiveness of mercury lights in modifying behavioral responses of smolts at a fish bypass structure. Daily and hourly passage of smolts was accessed by video recording. Migratory activity was mainly nocturnal, diurnal movements increasing at the end of emigration period. Analysis of results showed that the lights significantly increased the rate of passage, Visual observation showed that illumination duration, light location and intensity maybe important parameters in effective application of mercury lights for attraction. The effect of lights was not immediate : the maximum passage rate was observed more than half an hour following the activation of lights. Three to eight times as many fish were bypassed with the lights on than with the lights off.

Keywords

Authors Ronald P. Larkin, Barbara A. Frase

Year 1988 Larkin RP, Frase BA

Report Name Circular paths of birds flying near a broadcasting tower in cloud

Publication Journal of Comparative Psychology

Issue-page numbers Volume 102, Issue 1, March 1988, Pages 90-93

URL <http://www.sciencedirect.com/science/article/pii/S0735703602006918>

Abstract Tracks of birds migrating at night near an illuminated 308-m-tall broadcasting tower were recorded by using radar. During a period when low cloud surrounded the tower, birds flew in arcs or circles centered on the tower and having radii in excess of 100 m. Under clear skies or beneath cloud layers, arcs and circles were not observed. The data may contribute to understanding the behavioral mechanism of massive bird kills at tall lighted structures.

Keywords

Authors Laval, P., Baussant, T.

Year 1990 Laval P, Baussant T

Report Name Effect of the lights from an approaching submersible on the 15kHz deep scattering layer in the Ligurian Sea (Mediterranean)

Publication C. R. Acad. Sci. Paris

Issue-page numbers t. 311, Series III, 181 - 186

URL N/A

Abstract N/A

Keywords

Authors M Le Corre, A Ollivier, S Ribes, P Jouventin

Year 2002 Le Corre M, Ollivier A, Ribes S, Jouventin P

Report Name Light-induced mortality of petrels: A 4-year study from Reunion Island (Indian Ocean)

Publication Biological Conservation

Issue-page numbers Volume 105, Issue 1, May 2002, Pages 93-102

URL <http://www.sciencedirect.com/science/article/pii/S0006320701002075>

Abstract We report the results of a study of light-induced mortality of petrels at Réunion Island which holds two endemic endangered species, Barau's petrel (*Pterodroma barau*) and Mascarene petrel (*Pseudobulweria aterrima*), together with an endemic non threatened subspecies of Audubon's shearwater (*Puffinus lherminieri bailloni*). We collected 2348 birds attracted to lights between January 1996 and December 1999, among which 70% were Barau's petrels and 29% were Audubon's shearwaters. We found also three specimens of the very rare Mascarene petrel. Most grounded birds were fledglings (94%). Light-induced mortality was seasonal and linked with the breeding schedule of each species. At least 20–40% of the fledglings of Barau's petrels produced annually are attracted by lights. Light-induced mortality is a recent perturbation at Réunion Island. Thus, the effects of this disturbance on the population dynamics of these long lived seabirds may be hard to detect at the present time, but they are likely to occur in the near future. Conservation actions are proposed to limit the light-induced mortality together with other actions and long-term studies focused on the most endangered species.

Keywords Seabird; Anthropogenic perturbation; *Pterodroma*; *Pseudobulweria*

Authors J D Lebbin, Michael G Harvey, Timothy C Lenz, Michael J Andersen, Jesse M Ellis

Year 2007 Lebbin JD, Harvey MG, Lenz TC, et al.

Report Name Nocturnal migrants foraging at night by artificial light

Publication Wilson Journal Of Ornithology (2007)

Issue-page numbers Volume: 119, Issue: 3, Pages: 506-508

URL <http://www.mendeley.com/research/nocturnal-migrants-foraging-night-artificial-light-1/>

Abstract Artificial lights can have detrimental effects on nocturnal migrant birds and other wildlife, yet some species of typically diurnal insectivorous birds are capable of foraging at night under artificial illumination. Here, we report observations of at least 15 wood-warbler species (Parulidae), one tyrant-fly catcher (Tyrannidae), and one mimid (Mimidae) foraging at night in areas illuminated by powerful artificial lights. To our knowledge, our observations represent the first report of a mixed-species flock of birds foraging on insects attracted to artificial lights or within foliage illuminated by artificial light at night.

Keywords

Authors	E. Leclercq, J.F. Taylor, M. Sprague, H. Migaud
Year	2011 Leclercq E, Taylor JF, Sprague M, Migaud H
Report Name	The potential of alternative lighting-systems to suppress pre-harvest sexual maturation of 1+ Atlantic salmon (<i>Salmo salar</i>) post-smolts reared in commercial sea-cages
Publication	Aquacultural Engineering
Issue-page numbers	Volume 44, Issue 2, March 2011, Pages 35-47
URL	http://www.sciencedirect.com/science/article/pii/S0144860910000841
Abstract	<p>The aim of this study was to compare the efficiency of new candidate lighting-technologies (50 W 'blue' light-emitting-diode (B, λ_{max} = 465 nm); 232 W 'green' hot cathode, (G, λ_{max} = 546 nm); 400 W 'red' tungsten-halogen, (R, λ_{max} = 667–740 nm)) against a standard 400 W 'white' metal-halide used as control technology (C, broad spectrum) at suppressing sexual maturation of 1+ Atlantic salmon (<i>Salmo salar</i>) in sea-cages. A total of seven experimental set-ups were tested on a commercial-scale in three trials using a standardized photoperiod regime in the form of continuous artificial-light (LL) applied from winter to summer solstice during the second year at sea. The experimental stocks were raised under an ambient thermal regime that was similar across all trials.</p> <p>Technical performances (spectral output, light-attenuation and irradiance distance) of the individual light-units were measured and light perception was assessed by quantifying plasma melatonin levels. Body-size parameters (BW, FL, K) were measured at the switch-on and turn-off of the photoperiod regimes. Maturation rates were estimated at the end of the light treatments and at harvest. The B-unit provided the shortest effective irradiance distance (distance from the light-bulb to the minimum irradiance suppressing plasma melatonin to basal day-time level = 0.016 W m⁻²) but the longest relative to its energy consumption; while the G- and R-units did not offer a comparative advantage over the C-unit in that regard (B > C > G > R). Nocturnal plasma melatonin and maturation rate decreased proportionally to the light-intensity provided using a range of technologies emitting distinct spectral profiles. Light-intensity rather than light-spectral composition appeared to be the prime parameter negatively affecting sexual maturation. Maximal suppression of maturation was observed in treatments depressing nocturnal plasma melatonin to a 1.2-fold but not to a 1.7-fold increase compared to day-time levels, confirming that a threshold level of light-irradiance is necessary to obtain the desired effect. Results suggest that this can be achieved under standard commercial practices by applying, over the photoperiod regime presently used, continuous artificial-illumination with an (electrical) energy consumption of 0.28 Wh m⁻³ generating a mean-irradiance of 0.012 W m⁻² and providing a minimum volume of effective irradiance equivalent to 12% of the rearing-environment. Such a low volume of biologically effective irradiance was likely sufficient due to the strong photic attraction already reported in Atlantic salmon. Maximal suppression of pre-harvest sexual maturation can be achieved in the Atlantic salmon on-growing industry using alternative light-technologies. Present data provides methods and threshold values favouring the implementation of photoperiod manipulation to suppress pre-harvest maturation at the most advantageous scale and cost.</p>
Keywords	<i>Salmo salar</i> ; Lighting-technology; Light-intensity; Sexual maturation; Melatonin; Growth

Authors Jau H. Lee¹, Chi F. Hung², Chin C. Ho³, Shih H. Chang³, Yih S. Lai³, Jing G. Chung

Year 1997 Lee JH, Hung CF, Ho CC, et al.

Report Name Light-induced changes in frog pineal gland N-acetyltransferase activity

Publication Neurochemistry International

Issue-page numbers Volume 31, Issue 4, October 1997, Pages 533-540

URL <http://www.sciencedirect.com/science/article/pii/S0197018697000193>

Abstract N-Acetyltransferase (NAT) activity was determined in the pineal gland of frogs (*Rana tigrina*) of different ages using 2-aminofluorene and p-aminobenzoic acid as substrates, and assayed by high-pressure liquid chromatography. Frogs of different ages were either killed during the light phase or exposed to darkness or light for 1 min during the dark phase of the lighting cycle, then returned to their cages in darkness for 30 min before being killed. The pineal gland NAT activity of 1-month-old frogs was inhibited when the animal was nocturnally exposed to 1 min of light. Nocturnal light exposure did not inhibit NAT activity in 1-month-old frogs, even though these animal displayed clear light-dark differences in pineal gland NAT activity. Nocturnal light exposure did not inhibit night-time levels of NAT activity in 1-month-old animals which had been bilaterally enucleated, thus suggesting that this effect is retinally mediated. Pretreatment of 1-month-old and 6-month-old animals with isoproterenol (a beta-adrenoceptor agonist drug) prevented the nocturnal light-induced inhibition of NAT activity. From the different sensitivity of 1-month-old and 6-month-old animals to different intensities or durations of nocturnal light exposure it was found that the duration or intensity of light exposure was not able to inhibit nocturnal NAT activity. The NAT activity was at least 4–5-fold greater in 1-month-old frogs than in 6-month-old frogs. This is the first demonstration of the retino-pineal gland pathway that appears to produce light-induced changes in pineal glands of frogs 1-month-old or older, but this pathway only functions in 1-month-old frogs, and does not appear to function in 6-month-old frogs.

Keywords

Authors Amit Lerner, Nikolay Meltser, Nir Sapir, Carynelisa Erlick, Nadav Shashar and Meir Broza

Year 2008 Lerner A, Meltser N, Sapir N, et al.

Report Name Reflected polarization guides chironomid females to oviposition sites

Publication The Journal of Experimental Biology

Issue-page numbers 211, 3536-3543

URL <http://jeb.biologists.org/content/211/22/3536.full.pdf>

Abstract Chironomids (Diptera: Chironomidae; non-biting midges) are known to be carriers of the *Vibrio cholerae* bacterium, responsible for the fatal cholera disease in humans. It was recently discovered that chironomid females choose their oviposition site by a visual cue. In this study, we test the hypothesis that this visual cue is the linear polarization of light reflected from the water surface. We conducted two multiple choice field experiments using egg traps with different light intensities and polarizations. With controlled illumination, a higher number of eggs was found under both high intensity and high polarization. Under natural illumination, no eggs were found in the unpolarized traps, and the egg number increased with the percentage polarization regardless of the light intensity. Field measurements showed that at sunset, when chironomids are active, the intensity of light reflected from their natural ponds decreases by 96%, while the percentage polarization remains stable and high at 60%. Furthermore, the percentage polarization is positively correlated with the total organic carbon (TOC) concentration in the water. Orthogonal alignment of the microvilli found in ommatidia from the ventral part of the female eye may provide the anatomical basis for polarization sensitivity. We conclude that the percentage polarization of reflected light is the cue by which chironomid females choose their oviposition site. It is a stable cue and can provide information on the amount of food available to the larvae in the water. Based on our results, we suggest that manipulating the polarization of reflected light is a viable way to control chironomid populations and mitigate cholera dispersion.

Keywords polarization vision, chironomids, oviposition, habitat selection, water turbidity

Authors Bin Liu, Zecheng Zuo, Hongtao Liu, Xuanming Liu and Chentao Lin

Year 2011 Liu B, Zuo Z, Liu H, et al.

Report Name Arabidopsis cryptochrome 1 interacts with SPA1 to suppress COP1 activity in response to blue light

Publication Genes & Dev.

Issue-page numbers 2011. 25: 1029-1034 doi: 10.1101/gad.2025011

URL <http://genesdev.cshlp.org/content/25/10/1029.short>

Abstract Plant photoreceptors mediate light suppression of the E3 ubiquitin ligase COP1 (CONSTITUTIVE PHOTOMORPHOGENIC 1) to affect gene expression and photomorphogenesis. However, how photoreceptors mediate light regulation of COP1 activity remains unknown. We report here that Arabidopsis blue-light receptor cryptochrome 1 (CRY1) undergoes blue-light-dependent interaction with the COP1-interacting protein SPA1 (SUPPRESSOR OF PHYTOCHROME A). We further show that the CRY1-SPA1 interaction suppresses the SPA1-COP1 interaction and COP1-dependent degradation of the transcription factor HY5. These results are consistent with a hypothesis that photoexcited CRY1 interacts with SPA1 to modulate COP1 activity and plant development.

Keywords

Authors E. R. Loew

Year 1976 Loew ER

Report Name Light, and photoreceptor degeneration in the Norway lobster, *Nephrops norvegicus* (L.)

Publication Proceedings of the Royal Society of London. Series B, Biological Sciences

Issue-page numbers Vol. 193, No. 1110 (Mar. 30, 1976), pp. 31-44

URL <http://www.jstor.org/pss/77175>

Abstract The visual pigment of *Nephrops norvegicus* (L.), the Norway lobster, was measured microspectrophotometrically in isolated rhabdoms, and found to have a λ max at 498 nm. On exposure to light this pigment changed into a long-lived photoproduct of λ max 484 nm (and higher maximal extinction) which broke down slowly in the dark. The bleaching process affected the structural stability of the rhabdoms, resulting in their progressive degeneration. These in vitro effects were found to occur also in vivo by exposing lobsters, caught and maintained in darkness, to low-level illumination from a single fluorescent tube. Exposure of only 2.5 h duration was enough to cause complete degeneration of the rhabdoms within 24 h even though the animals were thereafter kept in darkness. It is suggested that this effect of light is a consequence of the rapid build-up of photoproduct in a species having a low regeneration rate of the visual pigment. When the major part of the visual pigment is in the thermally less-stable, bleached state, the structural integrity of the photoreceptor is affected, leading to degeneration. This type of degeneration might be induced in other 'dim light' species (e.g. deep-sea fishes) that may also have low rates of pigment regeneration.

Keywords

Authors Travis Longcore

Year 2010 Longcore T

Report Name Sensory Ecology: Night Lights Alter Reproductive Behavior of Blue Tits

Publication Current Biology

Issue-page numbers Volume 20, Issue 20, 26 October 2010, Pages R893-R895

URL <http://www.sciencedirect.com/science/article/pii/S0960982210010924>

Abstract Research on songbirds indicates that streetlights influence timing of dawn chorus, egg-laying and male success in siring extra-pair young, providing new evidence that artificial lighting is an ecologically disruptive force.

Keywords

Authors Travis Longcore and Catherine Rich

Year 2004 Longcore T, Rich C

Report Name Ecological light pollution

Publication Frontiers in Ecology and the Environment

Issue-page numbers 2: 191–198. doi:10.1890/1540-9295(2004)002[0191:ELP]2.0.CO;2

URL <http://www.esajournals.org/doi/abs/10.1890/1540-9295%282004%29002%5B0191%3AELP%5D2.0.CO%3B2>

Abstract Ecologists have long studied the critical role of natural light in regulating species interactions, but, with limited exceptions, have not investigated the consequences of artificial night lighting. In the past century, the extent and intensity of artificial night lighting has increased such that it has substantial effects on the biology and ecology of species in the wild. We distinguish “astronomical light pollution”, which obscures the view of the night sky, from “ecological light pollution”, which alters natural light regimes in terrestrial and aquatic ecosystems. Some of the catastrophic consequences of light for certain taxonomic groups are well known, such as the deaths of migratory birds around tall lighted structures, and those of hatchling sea turtles disoriented by lights on their natal beaches. The more subtle influences of artificial night lighting on the behavior and community ecology of species are less well recognized, and constitute a new focus for research in ecology and a pressing conservation challenge.

Keywords

Authors Longcore T, Rich C, Mineau P, MacDonald B, Bert DG, et al.

Year 2012 Longcore T, Rich C, Mineau P, MacDonald B, et al.

Report Name An Estimate of Avian Mortality at Communication Towers in the United States and Canada

Publication PLoS ONE

Issue-page numbers 7(4): e34025. doi:10.1371/journal.pone.0034025

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0034025>

Abstract Avian mortality at communication towers in the continental United States and Canada is an issue of pressing conservation concern. Previous estimates of this mortality have been based on limited data and have not included Canada. We compiled a database of communication towers in the continental United States and Canada and estimated avian mortality by tower with a regression relating avian mortality to tower height. This equation was derived from 38 tower studies for which mortality data were available and corrected for sampling effort, search efficiency, and scavenging where appropriate. Although most studies document mortality at guyed towers with steady-burning lights, we accounted for lower mortality at towers without guy wires or steady-burning lights by adjusting estimates based on published studies. The resulting estimate of mortality at towers is 6.8 million birds per year in the United States and Canada. Bootstrapped subsampling indicated that the regression was robust to the choice of studies included and a comparison of multiple regression models showed that incorporating sampling, scavenging, and search efficiency adjustments improved model fit. Estimating total avian mortality is only a first step in developing an assessment of the biological significance of mortality at communication towers for individual species or groups of species. Nevertheless, our estimate can be used to evaluate this source of mortality, develop subsequent per-species mortality estimates, and motivate policy action.

Keywords

Authors Loughrin, J.H., hamilton-kemp, T.R., Andersen, R.A., Hildebrand, D.F.

Year 1990 Loughrin JH, Hamilton-kemp TR, Andersen RA, Hildebrand DF

Report Name Volatiles from flowers of *Nicotiana Silvestris*, *N. otophora* and *malus domestica*: Headspace component and day/night changes in their relative concentrations

Publication Photochemistry

Issue-page numbers 29, 2473-2477

URL N/A

Abstract N/A

Keywords

Authors Mahoney, J. J. and V. H. Hutchison

Year 1969 Mahoney JJ, Hutchison VH

Report Name Photoperiod acclimation and 24-hour variations in the critical thermal maxima of a tropical and a temperate frog

Publication Oecologia

Issue-page numbers 2:143-161

URL <http://www.jstor.org/pss/4214510>

Abstract The effect of photoperiod on the upper thermal tolerance of two species of frogs was studied by using the critical thermal maximum (CTM) as the end point. Both species are heliotropic and from temperate climates, but *Hyla labialis* lives under a near constant tropical photoperiod while *Rana pipiens* lives under a varying temperatezone photoperiod. The CTM of both species was studied over a 24-hour period to determine if a rhythm of temperature tolerance exists. In all but one of the acclimatization conditions used, the CTM of *R. pipiens* was higher than that of *H. labialis*. This agrees with what is known of their thermal ecology. Photoperiod significantly affects the CTM of both species. For *Rana pipiens* long (LD 16:8) photoperiods result in significantly higher thermal tolerance than short (LD 8:16) or moderate (LD 12:12) photoperiods at both 15 and 25°C. *H. labialis* shows a different pattern, having highest CTM at 25°C, LD 12:12 and lowest at 15°C, LD 12:12. When acclimated to a short (LD 8:16) photoperiod certain aspects of the frogs' tolerance of high temperatures are altered. At the same acclimatization the CTM of *R. pipiens* is higher than that of *H. labialis*, except under a combination short light regime and low temperature, and *H. labialis* at LD 8:16 shows no thermal acclimation between 15 and 25°C. Significant variation in the CTM over a 24-hour period occurred in *H. labialis* acclimatized at 25°C, LD 12:12 and *R. pipiens* at 25°C, LD 8:16 and 15°C, LD 12:12. For both species the 24-hour rhythm of temperature tolerance, when it occurs at LD 12:12, might be of adaptive value. Times of highest thermal tolerance are in the late morning or early afternoon and lowest tolerance is during the dark period. For *R. pipiens* under the unnatural combination of 25°C, LD 8:16, the pattern is reversed. When all three significant cycles are phase shifted so that the times of highest tolerance coincide, the pattern of the curves is very similar.

Keywords

Authors C Maier

Year 1992 Maier C

Report Name Activity patterns of pipistrelle bats (*Pipistrellus pipistrellus*) in Oxfordshire

Publication Journal of Zoology London

Issue-page numbers Volume: 228, Issue: 1, Pages: 69-80

URL <http://www.mendeley.com/research/pipistrellus-sp/>

Abstract A maternity colony of pipistrelle bats (*Pipistrellus pipistrellus*), in Oxfordshire, was monitored between 1 March 1989 and 6 October 1989. An infra-red automatic bat counter was installed at the roost, to record the number of bats entering and leaving each minute throughout the night. Air temperature, light intensity at sunset, cloud cover, wind speed and rain were recorded on each night of monitoring. Insect abundance was estimated on 18 nights. The nightly activity pattern was found to be unimodal in pregnancy, bimodal during lactation and unimodal post-weaning. The mean time that each bat spent outside the roost ranged from 103-483 min, with a mean of 321 min. Ambient air temperature and length of night were significant factors affecting mean time spent outside the roost. The percentage of the night which the bats spent away from the roost ranged from 22 to 88%, with a mean of 64%. There was a significant positive correlation between ambient air temperature and percentage of the night spent away from the roost. Insect abundance showed no significant correlation with the time that bats spent outside the roost. Wind and rain had no apparent effect on time spent outside the roost.

Keywords

Authors Manville, Albert M., II.

Year 2000 Manville AM

Report Name The ABCs of avoiding bird collisions at communication towers: the next steps

Publication Proceedings of the Avian Interactions Workshop

Issue-page numbers December 2, 1999, Charleston, SC. Electric Power Research Institute.

URL http://library.fws.gov/bird_publications/tower_collisions00.htm

Abstract Published accounts of avian collisions with tall, lit structures date back in North America to at least 1880. Long-term studies of the impacts of communication towers on birds are more recent, the first having begun in 1955. This paper will review the known and suspected causes of bird collisions with communication towers (e.g., lighting color, light duration, and electromagnetic radiation), assess gaps in our information base, discuss what is being done to fill those gaps, and review the role of the U.S. Fish and Wildlife Service (FWS or Service) in dealing with this important problem. This paper will also review avian vulnerability to collisions with tall structures, currently affecting nearly 350 species of neotropical migratory songbirds that breed in North America in the spring and summer and migrate to the southern United States, the Caribbean, or Latin America during the fall and winter. These species generally migrate at night and appear to be most susceptible to collisions with lit towers when foggy, misty, low-cloud-ceiling conditions occur during their spring and fall migrations. Thrushes, Vireos, and Warblers are the species that seem the most vulnerable. Lit towers, those exceeding 199 feet (61 m) above the ground, currently number about 46,000 in the United States (not including lit "poles"), with the total number of towers registered in the Federal Communications Commission database listed at some 75,000. Also included in this paper are preliminary voluntary recommendations designed to help minimize bird collisions with towers, as well as a review of activities that prompted recent FWS action in dealing with this issue. This paper will further review two partnerships with the electric utility and electric wind generation industries -- the Avian Power Line Interaction Committee and the National Wind Coordinating Committee's Avian Subcommittee, respectively -- as possible models for a future partnership with the communication industry (i.e., radio, television, cellular, and microwave).

Keywords Avian mortality, bird watching, bird strikes, collisions, communication towers, guy wires, habitat management, lights,

Authors Roberto Marangoni, Debora Paris, Dominique Melck, Lorenzo Fulgentini, Giuliano Colombetti and Andrea Motta

Year 2011 Marangoni R, Paris D, Melck D, et al.

Report Name Understanding UV-driven metabolism in the hypersaline ciliate *Fabrea salina*

Publication European Biophysics Journal

Issue-page numbers DOI: 10.1007/s00249-011-0775-3

URL <http://www.springerlink.com/content/m2333v5221121241/>

Abstract By using NMR spectroscopy, a non-invasive investigation technique, we performed in vivo experiments aimed at uncovering the metabolic pathways involved in the early response of *Fabrea salina* cells to ultraviolet (UV) radiation. This hypersaline ciliate was chosen as a model organism because of its well-known high resistance to UV radiation. Identical cell samples were exposed to visible radiation only (control samples, CS) and to UV-B + UV-A + visible radiation (treated samples, TS), and NMR spectra of in vivo cells were collected at different exposure times. Resonances were identified through one- and two-dimensional experiments. To compare experiments performed at variable irradiation times on different culture batches, metabolite signals affected by the UV exposure were normalized to corresponding intensity at $\tau = 0$, the zero exposure time. The most affected metabolites are all osmoprotectants, namely, choline, glycine-betaine, betaines, ectoine, proline, α -trehalose and sucrose. The time course of these signals presents qualitative differences between CS and TS, and most of these osmoprotectants tend to accumulate significantly in TS in a UV dose-dependent manner. A picture of the immediate stress response of *F. salina* against UV radiation in terms of osmoprotection, water retention and salting-out prevention is described.

Keywords *Fabrea salina* – NMR – Osmoprotectant – Metabolomics – Hypersaline

Authors Mara Marchesan, Maurizio Spoto, Laura Verginella, Enrico A. Ferrero

Year 2005 Marchesan M, Spoto M, Verginella L, Ferrero EA

Report Name Behavioural effects of artificial light on fish species of commercial interest

Publication Fisheries Research

Issue-page numbers Volume 73, Issues 1-2, June 2005, Pages 171-185

URL <http://www.sciencedirect.com/science/article/pii/S0165783604003133>

Abstract The aim of this study was to investigate the effects of artificial light of variable intensity and wavelength on aggregation, phototaxis and photokinesis in the European seabass *Dicentrarchus labrax*, the common grey mullet *Mugil cephalus*, the gilthead seabream *Sparus auratus* and the striped bream *Lithognathus mormyrus*. Two sets of experiments were carried out in laboratory conditions: during the first set light intensity was either increased or decreased in eight discrete steps, in the range 0.2–68 $\mu\text{E s}^{-1} \text{m}^{-2}$. During the second set light colour was shifted either from the shorter to the longer wavelengths of the visual spectrum or back, using six different colour filters. Overall, the common grey mullet and the gilthead seabream showed the strongest attraction to light. Such a positive response was enhanced by the mode of intensity variation. The striped bream tended to be attracted to light at all illumination levels. Instead, the European seabass was neither particularly attracted nor inhibited by the presence of light. The grey mullet showed a strong positive response also to monochromatic stimuli, especially of shorter wavelength. The seabass was noticeably affected by shorter wavelength lights as well. However, in this case colours such as blue and green induced strong repulsion. Similarly, the seabream was conspicuously repelled by monochromatic lights. The striped bream did not show any remarkable reactions to coloured lights. These results contributed to the ecological classification of species according to their visual behaviour patterns towards artificial light. Such findings may provide useful suggestions for the development of selective light fishing techniques. The rationalisation of light fishing on a large scale would help to improve the quality of marine environment management both in exploited and in novel fishing grounds.

Keywords Fish behaviour; Vision; Illumination; Artificial light; Light fishing

Authors Joop M. Marquenie ; Hanneke Poot ; Maurice A. H. Donners ; Bruno J. Ens ; Han de Vries ; Marcel R. Wernand

Year 2012 Marquenie JM, Poot H, Donners MAH, et al.

Report Name Green Light for Nocturnally Migrating Birds

Publication Ecology and Society

Issue-page numbers 2008 Volume: 13 Issue: 2 pages/rec.No: 47

URL <http://www.doaj.org/doi/func=abstract&id=1085551>

Abstract The nighttime sky is increasingly illuminated by artificial light sources. Although this ecological light pollution is damaging ecosystems throughout the world, the topic has received relatively little attention. Many nocturnally migrating birds die or lose a large amount of their energy reserves during migration as a result of encountering artificial light sources. This happens, for instance, in the North Sea, where large numbers of nocturnally migrating birds are attracted to the many offshore platforms. Our aim is to develop bird-friendly artificial lighting that meets human demands for safety but does not attract and disorient birds. Our current working hypothesis is that artificial light interferes with the magnetic compass of the birds, one of several orientation mechanisms and especially important during overcast nights. Laboratory experiments have shown the magnetic compass to be wavelength dependent: migratory birds require light from the blue-green part of the spectrum for magnetic compass orientation, whereas red light (visible long-wavelength) disrupts magnetic orientation. We designed a field study to test if and how changing light color influenced migrating birds under field conditions. We found that nocturnally migrating birds were disoriented and attracted by red and white light (containing visible long-wavelength radiation), whereas they were clearly less disoriented by blue and green light (containing less or no visible long-wavelength radiation). This was especially the case on overcast nights. Our results clearly open perspective for the development of bird-friendly artificial lighting by manipulating wavelength characteristics. Preliminary results with an experimentally developed bird-friendly light source on an offshore platform are promising. What needs to be investigated is the impact of bird-friendly light on other organisms than birds.

Keywords artificial light ; bird-friendly lighting ; ecological light pollution ; light color ; magnetic compass ; nocturnally migrating birds ; orientation

Authors Martin, G.R.

Year 1990 Martin GR

Report Name The visual problems of nocturnal migration

Publication Bird Migration

Issue-page numbers Springer-Verlag, Berlin, pp. 185-197

URL N/A

Abstract N/A

Keywords

Authors	Vincent Martineau, Mark Lefsrud, Most Tahera Naznin, Dean A. Kopsell
Year	2012 Martineau V, Lefsrud M, Naznin MT, Kopsell DA
Report Name	Comparison of Light-emitting Diode and High-pressure Sodium Light Treatments for Hydroponics Growth of Boston Lettuce
Publication	HortScience
Issue-page numbers	April 2012 vol. 47 no. 4 477-482
URL	http://hortsci.ashspublications.org/content/47/4/477.abstract
Abstract	Recent irradiance level improvements in light-emitting diode (LED) technology has allowed this equipment to compete as suitable replacements to traditional high-pressure sodium (HPS) lamps in hydroponics growth environments. The current study compares LED and HPS lighting technologies for supplemental lighting in a greenhouse at HydroSerre Mirabel (Mirabel, Quebec, Canada) for the growth of Boston lettuce (<i>Lactuca sativa</i> var. <i>capitata</i>). The light treatments were applied for 2 hours before sunset and 8.5 hours after sunset to extend the photoperiod to 18 hours. An average total light irradiance (natural and supplemental) of 71.3 mol·m ⁻² for HPS and 35.8 mol·m ⁻² for LED were recorded over the 4 weeks of each experimental run. Wet and dry biomass of the shoots was recorded. On average, HPS light treatments produced significantly similar shoot biomass compared with LED light treatment, although the LED lamps provided roughly half the amount of supplemental light compared with the HPS lamps during the 4 weeks of the experimental treatment. Analysis of the lettuce samples showed no significant difference in concentrations of β-carotene, chlorophyll a, chlorophyll b, neoxanthin, lutein, and antheraxanthin among the light treatments; however, violaxanthin concentrations showed a statistical difference resulting from light treatment. When measured on an energy basis, the LED lamps provide an energy savings of at least 33.8% and the minimal “regular” HPS provided an energy savings of 77.8% over the HPS treatment.
Keywords	HPS, LED, greenhouse, light, energy <i>Lactuca sativa</i> var. <i>capitata</i> , phytochemicals, β-carotene

Authors Alex O. Mason, Sean Duffy, Sheng Zhao, Takayoshi Ubuka, George E. Bentley, Kazuyoshi Tsutsui, Rae Silver, and Lance J. Kriegsfeld

Year 2010 Mason AO, Duffy S, Zhao S, et al.

Report Name Photoperiod and Reproductive Condition Are Associated with Changes in RFamide-Related Peptide (RFRP) Expression in Syrian Hamsters (*Mesocricetus auratus*)

Publication J Biol Rhythms

Issue-page numbers June 2010 vol. 25 no. 3 176-185

URL <http://jbr.sagepub.com/content/25/3/176.abstract>

Abstract To conserve scarce energetic resources during winter, seasonal breeders inhibit reproduction and other nonessential behavioral and physiological processes. Reproductive cessation is initiated in response to declining day lengths, a stimulus represented centrally as a long-duration melatonin signal. The melatonin signal is not decoded by the reproductive axis directly, but by an unidentified neurochemical system upstream of gonadotropin-releasing hormone (GnRH). The dorsomedial nucleus of the hypothalamus (DMH) has been implicated in seasonal changes in reproductive function in Syrian hamsters (*Mesocricetus auratus*), although the specific-cell phenotype decoding photoperiodic information remains unknown. RFamide-related peptide (RFRP; the mammalian homolog of the gonadotropin-inhibitory hormone (GnIH) gene identified in birds) has emerged as a potent inhibitory regulator of the reproductive axis and, significantly, its expression is localized to cell bodies of the DMH in rodents. In the present study, the authors explored the relationship between RFRP expression, photoperiod exposure, and reproductive condition/hormonal status. In male hamsters that respond to short days with reproductive inhibition, RFRP-ir and mRNA expression are markedly reduced relative to long-day animals. Replacement of testosterone in short-day animals did not affect this response, suggesting that alterations in RFRP expression are not a result of changing sex steroid concentrations. A subset of the hamster population that ignores day length cues and remains reproductively competent in short days (nonresponders) exhibits RFRP-ir expression comparable to long-day hamsters. Analysis of cell body and fiber density suggests a potential interplay between peptide production and release rate in differentially regulating the reproductive axis during early and late stages of reproductive regression. Together, the present findings indicate that photoperiod-induced suppression of reproduction is associated with changes in RFRP and mRNA expression, providing opportunity for further exploration on the role that RFRP plays in this process.

Keywords

Authors Matos-Cruz V, Blasic J, Nickle B, Robinson PR, Hattar S, Marnie E. Halpern

Year 2011 Matos-Cruz V, Blasic J, Nickle B, et al.

Report Name Unexpected Diversity and Photoperiod Dependence of the Zebrafish Melanopsin System

Publication PLoS ONE

Issue-page numbers 6(9): e25111. doi:10.1371/journal.pone.0025111

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0025111>

Abstract Animals have evolved specialized photoreceptors in the retina and in extraocular tissues that allow them to measure light changes in their environment. In mammals, the retina is the only structure that detects light and relays this information to the brain. The classical photoreceptors, rods and cones, are responsible for vision through activation of rhodopsin and cone opsins. Melanopsin, another photopigment first discovered in *Xenopus melanophores* (Opn4x), is expressed in a small subset of retinal ganglion cells (RGCs) in the mammalian retina, where it mediates non-image forming functions such as circadian photoentrainment and sleep. While mammals have a single melanopsin gene (opn4), zebrafish show remarkable diversity with two opn4x-related and three opn4-related genes expressed in distinct patterns in multiple neuronal cell types of the developing retina, including bipolar interneurons. The intronless opn4.1 gene is transcribed in photoreceptors as well as in horizontal cells and produces functional photopigment. Four genes are also expressed in the zebrafish embryonic brain, but not in the photoreceptive pineal gland. We discovered that photoperiod length influences expression of two of the opn4-related genes in retinal layers involved in signaling light information to RGCs. Moreover, both genes are expressed in a robust diurnal rhythm but with different phases in relation to the light-dark cycle. The results suggest that melanopsin has an expanded role in modulating the retinal circuitry of fish.

Keywords

Authors McCoid, M.J., and R.A. Hensle

Year 1993 McCoid MJ, Hensle RA

Report Name Shifts in activity patterns in lizards

Publication Herpetological Review

Issue-page numbers 24(3): 87-88

URL http://www.ssarbooks.com/?page=shop/flypage&product_id=13720&CLSN_3147=13087212083147f58b68c0920d3da9e1

Abstract N/A

Keywords

Authors Shaun McCoshum and John Z. Kiss

Year 2011 McCoshum S, Kiss JZ

Report Name Green light affects blue-light-based phototropism in hypocotyls of *Arabidopsis thaliana*

Publication The Journal of the Torrey Botanical Society

Issue-page numbers Oct 2011 / pg(s) 409-417

URL <http://www.bioone.org/doi/abs/10.3159/TORREY-D-11-00040.1>

Abstract Light affects all aspects of plant growth and development from seed germination to senescence. While there has been intensive investigation of the effects of blue and red light on development and tropisms, much less is known about the specific effects of green light exposure in plants. Several recent studies demonstrate that monochromatic green light has a number of physiological effects including antagonizing light-mediated growth inhibition in hypocotyls and reversing blue-light-induced stomatal opening. In this paper, we report on the effects of green light pulses on phototropism in both light- and dark-grown seedlings of *Arabidopsis thaliana*. Green light had no effect on either red-light or blue-light-based phototropism in roots. However, in hypocotyls of dark-grown seedlings, pulses of green light significantly reduced blue-light positive phototropism while the growth rate was increased. In contrast, in hypocotyls of light-grown seedlings, green pulses significantly increased positive phototropic curvature while there was no significant effect on growth rate. The observed effects of green light may occur by perception through the phytochromes or via a novel undiscovered green light receptor. Taken together, these results suggest that care should be taken when green illumination is used as a "safe" light in studies of plant development. While green light effects may be more subtle compared to red and blue effects, monochromatic green illumination can influence the growth and development of seedlings.

Keywords *Arabidopsis thaliana*, green light effects, photoreceptors, phototropism, phytochrome

Authors Flemming Ravn Merkel, Kasper Lambert Johansen

Year 2011 Merkel FR, Johansen KL

Report Name Light-induced bird strikes on vessels in Southwest Greenland

Publication Marine Pollution Bulletin

Issue-page numbers In Press, Corrected Proof

URL <http://www.sciencedirect.com/science/article/pii/S0025326X11004644>

Abstract Light-induced bird strikes are known to occur when vessels navigate during darkness in icy waters using powerful searchlight. In Southwest Greenland, which is important internationally for wintering seabirds, we collected reports of incidents of bird strikes over 2–3 winters (2006–2009) from navy vessels, cargo vessels and trawlers (total n = 19). Forty-one incidents were reported: mainly close to land (<4 km, 78%), but one as far offshore as 205 km. Up to 88 birds were reported killed in a single incident. All occurred between 5 p.m. and 6 a.m. and significantly more birds were involved when visibility was poor (snow) rather than moderate or good. Among five seabird species reported, the common eider (*Somateria mollissima*) accounted for 95% of the bird casualties. Based on spatial analyses of data on vessel traffic intensity and common eider density we are able to predict areas with high risk of bird strikes in Southwest Greenland.

Keywords

Authors Christine Merlin, Stanley Heinze, Steven M Reppert

Year 2011 Merlin C, Heinze S, Reppert SM

Report Name Unraveling navigational strategies in migratory insects

Publication Current Opinion in Neurobiology

Issue-page numbers In Press, Corrected Proof - Note to users doi:10.1016/j.conb.2011.11.009

URL <http://www.sciencedirect.com/science/article/pii/S0959438811002108>

Abstract Long-distance migration is a strategy some animals use to survive a seasonally changing environment. To reach favorable grounds, migratory animals have evolved sophisticated navigational mechanisms that rely on a map and compasses. In migratory insects, the existence of a map sense (sense of position) remains poorly understood, but recent work has provided new insights into the mechanisms some compasses use for maintaining a constant bearing during long-distance navigation. The best-studied directional strategy relies on a time-compensated sun compass, used by diurnal insects, for which neural circuits have begun to be delineated. Yet, a growing body of evidence suggests that migratory insects may also rely on other compasses that use night sky cues or the Earth's magnetic field. Those mechanisms are ripe for exploration.

Keywords

Authors Meyer, Lars Alan

Year 2012 Meyer LA

Report Name In Light of Energy: Influences of Light Pollution on Linked Stream-Riparian Invertebrate Communities

Publication Aquatic Sciences; Ecology; Freshwater Ecology

Issue-page numbers Document number: osu1345479410

URL http://etd.ohiolink.edu/view.cgi?acc_num=osu1345479410

Abstract The world's human population is expected to expand to nine billion by the year 2050, with 70% projected to be living in cities. As urban populations grow, cities are producing an ever-increasing intensity of ecological light pollution (ELP). At the individual and population levels, artificial night lighting has been shown to influence predator-prey relationships, migration patterns, and reproductive success of many aquatic and terrestrial species. With few exceptions, the effects of ELP on communities and ecosystems remain unexplored. My research investigated the potential influences of ELP on stream-riparian invertebrate communities and trophic dynamics, as well as the reciprocal aquatic-terrestrial exchanges that are critical to ecosystem function. From June 2010 to June 2011, I conducted bimonthly surveys of aquatic emergent insects, terrestrial arthropods, and riparian spiders of the family Tetragnathidae at nine Columbus, OH stream reaches of differing ambient ELP levels (low: 0 - 0.5 lux; moderate: 0.5 - 2 lux; high 2 - 4 lux). In August 2011, I experimentally increased light levels at the low and moderate treatment reaches to ~12 lux. I quantified invertebrate biomass, family richness, density (individuals m⁻²) of aquatic and terrestrial invertebrates, and measured reciprocal stream-terrestrial invertebrate fluxes. Using stable isotopes of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$), I estimated trophic position, variability in trophic position, food-chain length, and contribution of aquatic (i.e., epilithic algae) vs. terrestrial (i.e., leaf litter detritus) carbon. </p>

I found that light strongly influenced invertebrate family richness, biomass, and density for discrete time periods over the course of the year. The experimental addition of light resulted in a ~42% decrease in tetragnathid spider density, a ~54% decrease in aquatic emergent insect biomass, a ~16% decrease in aquatic emergent insect family richness, and a ~38% decrease in density of terrestrial arthropods entering stream. Trophic position and variability in trophic position for the stream-riparian invertebrate community, as well as, the families Tetragnathidae, Formicidae, and Chaoboridae showed a strong positive relationship with ELP. The experimental addition of light resulted in a ~2 trophic position increase in food-chain length and a two-fold increase in variability in trophic position. Artificial light was also related to the contribution of aquatic vs. terrestrial C at both the invertebrate community and family levels, such that the contribution of aquatic C was lowest at moderate ELP and greatest at high ELP. Collectively, these results are among the first to show the ecological consequences of ELP at both community and ecosystem levels of biological organization.

Keywords

Authors W.E. Meyer, J.R. Millam

Year 0 Meyer WE, Millam JR

Report Name Plasma melatonin levels in japanese quail exposed to dim light are determined by subjective interpretation of day and night, not light intensity

Publication General and Comparative Endocrinology

Issue-page numbers Volume 82, Issue 3, June 1991, Pages 377-385

URL <http://www.sciencedirect.com/science/article/pii/001664809190313U>

Abstract Plasma melatonin levels were measured in male Japanese quail exposed to lighting schedules consisting of combinations of bright light (2000 or 1500 lx), darkness, or dim light (2 lx) or to constant dim light. Melatonin levels in dim light were dependent upon the relative intensity of accompanying phases, being significantly higher when dim light was subjective night than when it was subjective day. There was no significant melatonin rhythm in constant dim light, even on the first day of constant dim light exposure. Melatonin levels were intermediate when dim light was accompanied by both bright light and darkness. These results indicate that melatonin secretion in birds does not depend solely on light intensity. Furthermore, these results suggest that the avian circadian system may be more sensitive to environmental cues than its mammalian counterpart.

Keywords

Authors V. B. Meyer-Rochow

Year 1994 Meyer-Rochow VB

Report Name Light-induced damage to photoreceptors of spiny lobsters and other crustaceans

Publication Crustaceana

Issue-page numbers Vol. 67, No. 1, Proceedings of the Fourth International Workshop on Lobster Biology and Management, 1993 (Jul., 1994), pp. 95-109

URL <http://www.jstor.org/pss/20104970>

Abstract Light-induced damage to the photoreceptors of lobsters, since it was first reported by Loew (1976), has been confirmed for a large variety of crustacean species. In the majority of these studies attention was focused on the crustacean retina and its principal structural elements, the retinula cells with their rhabdomeres. The effects bright lights have on the integrity and physical properties of the dioptric structures are far less well known and behavioural studies on experimentally blinded crustaceans are scarcer still. One puzzle to all researchers in the field has been why the severity of light-induced damage varied so much between not only different species of crustaceans, but also individuals of the same species. It is now believed that a combination of pre-adaptation to light, environmental temperature, diet, and blood-borne substances such as serotonin, ascorbic acid and small proteins could provide the explanation.

Keywords

Authors Milius, S.
Year 1999 Milius S
Report Name Nocturnal spider favors artificial lights
Publication Science News
Issue-page numbers 155(26), 407
URL <http://www.sciencenews.org/pages/pdfs/data/1999/15526/15526-10.pdf>
Abstract Spiders that spin their webs near lights at night to feast on bedazzled insects may be responding to more than the abundance of easy meals. For the first time, say researchers, a laboratory test has shown that a spider that feeds at night has an inborn preference for building webs near artificial light.

Keywords

Authors Miller, R
Year 1998 Miller R
Report Name Flocks of crows making urban areas home, so look out below
Publication The News-Times
Issue-page numbers December 28
URL N/A
Abstract N/A

Keywords

Authors S Minuccia, G.Chieffi Baccarib, L Di Matteo, C Marmorinoa, M D'istriaa, G Chieffic

Year 1990 Minuccia S, Baccarib GC, Di Matteo L, et al.

Report Name Influence of light and temperature on the secretory activity of the harderian gland of the green frog, Rana esculenta

Publication Comparative Biochemistry and Physiology Part A: Physiology

Issue-page numbers Volume 95, Issue 2, 1990, Pages 249-252

URL <http://www.sciencedirect.com/science/article/pii/0300962990902068>

Abstract #
1. □1. The secretory activity of the Harderian gland in Rana esculenta varies during the year, reaching its highest activity during the hottest period (July–August). Therefore, secretion may be modulated by temperature and/or photoperiod.

2. □2. Adult males and females were placed under several combinations of light and temperature in two different periods of the year (February and July) in order to elucidate their respective roles, if any, on the stimulation of secretion.

3. □3. Under experimental conditions, high temperature (24°C), irrespective of the photoperiod selected, stimulates secretion shown both at histological and histochemical levels.

4. □4. Low temperature (8°C) impairs secretory activity, again independently of the photoperiod selected.

5. □5. This data suggests that the secretion of the Harderian gland in Rana esculenta is modulated mainly by temperature.

Keywords

Authors Ralph E Mistlberger, Michael C Antle

Year 2011 Mistlberger RE, Antle MC

Report Name Entrainment of circadian clocks in mammals by arousal and food

Publication Essays Biochem

Issue-page numbers (2011) 49, (119–136) (Printed in Great Britain)

URL <http://essays.biochemistry.org/bsessays/049/bse0490119.htm>

Abstract Circadian rhythms in mammals are regulated by a system of endogenous circadian oscillators (clock cells) in the brain and in most peripheral organs and tissues. One group of clock cells in the hypothalamic SCN (suprachiasmatic nuclei) functions as a pacemaker for co-ordinating the timing of oscillators elsewhere in the brain and body. This master clock can be reset and entrained by daily LD (light–dark) cycles and thereby also serves to interface internal with external time, ensuring an appropriate alignment of behavioural and physiological rhythms with the solar day. Two features of the mammalian circadian system provide flexibility in circadian programming to exploit temporal regularities of social stimuli or food availability. One feature is the sensitivity of the SCN pacemaker to behavioural arousal stimulated during the usual sleep period, which can reset its phase and modulate its response to LD stimuli. Neural pathways from the brainstem and thalamus mediate these effects by releasing neurochemicals that inhibit retinal inputs to the SCN clock or that alter clock-gene expression in SCN clock cells. A second feature is the sensitivity of circadian oscillators outside of the SCN to stimuli associated with food intake, which enables animals to uncouple rhythms of behaviour and physiology from LD cycles and align these with predictable daily mealtimes. The location of oscillators necessary for food-entrained behavioural rhythms is not yet certain. Persistence of these rhythms in mice with clock-gene mutations that disable the SCN pacemaker suggests diversity in the molecular basis of light- and food-entrainable clocks.

Keywords

Authors Ashli F. Moore and Michael Menaker

Year 2012 Moore AF, Menaker M

Report Name Photic resetting of the circadian clock is correlated with photic habitat in Anolis lizards

Publication Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology

Issue-page numbers DOI: 10.1007/s00359-012-0715-4

URL <http://www.springerlink.com/content/ph0669577764285/>

Abstract Circadian rhythms are regulated by an internal clock, which is itself synchronized to environmental cues such as light and temperature. It is widely assumed that the circadian system is adapted to local cues, which vary enormously across habitats, yet the comparative data necessary for testing this idea are lacking. We examined photic and thermal resetting of the circadian clock in five species of Anolis lizards whose microhabitats differ in the amounts of sun and shade. The primary circadian oscillator in Anolis is the pineal gland, which produces the hormone melatonin. A flow-through culture system was employed to measure rhythmic melatonin output from individually cultured pineal glands. All species showed temperature-compensated circadian rhythms of pineal melatonin. Light caused significant phase delays of the melatonin rhythm, and this effect varied among species. Controlling for phylogenetic differences, the results indicate that the pineal glands of shade-dwelling species are more sensitive to photic resetting than species living in more brightly illuminated habitats. The differences were not due to variation in free-running period, but may be due to variation in oscillator phase and/or robustness. Surprisingly, thermal resetting was not statistically significant. Overall, the results suggest that the Anolis circadian system is adapted to photic habitat.

Keywords Circadian – Clock – Pineal – Anolis – Light

Authors Moore, M.V., S.J. Kohler, and M. Cheers

Year 2004 Moore MV, Kohler SJ, Cheers M

Report Name Artificial light at night in freshwater habitats and its potential ecological effects

Publication In: C. Rich and T. Longcore [eds.], Ecological consequences of artificial night lighting

Issue-page numbers Island Press.

URL Book

Abstract N/A

Keywords

Authors Marianne V. Moore, Stephanie M. Pierce, Hannah M. Walsh, Siri K. Kvalvik and Julie D. Li

Year 2000 Moore MV, Pierce SM, Walsh HM, et al

Report Name Urban light pollution alters the diel vertical migration of Daphnia

Publication Verh. Internat. Verein. Limnol.

Issue-page numbers 27: 1-4

URL http://www.wellesley.edu/Biology/Faculty/Mmoore/Content/Moore_2000.pdf

Abstract Light is the fundamental factor controlling the diel vertical migration (DVM) of zooplankton (RINGELBERG 1987, HANEY 1993). It not only serves as the proximate cue triggering the ascent of zooplankton, but it also reduces the amplitude of migration if light levels are sufficiently high at night. For example, the light of a full moon reduces the amplitude of Daphnia (GLIWICZ 1986, DODSON 1990) and chaoborid (SMITH et al. 1992) migrations. Night-time light intensities, however, are influenced not only by moonlight but also by artificial outdoor lighting, particularly in urban areas. Light pollution, or the sky glow produced by inefficient outdoor lighting, is prevalent in metropolitan areas (LOCKWOOD et al. 1990), and these areas often border freshwater lakes, coastal ecosystems, or both. Urban water quality may be influenced indirectly by light pollution, because zooplankton grazing influences water quality and the depth distribution of many zooplankters is affected by light. We tested the hypothesis that light pollution associated with urban areas reduces the amplitude and magnitude of zooplankton vertical migration. A field experiment manipulating underwater light intensity at night was performed in a suburban lake bordering a large metropolitan area.

Keywords Aquatic Invertebrates

Authors Morgan WW, Mizell S.

Year 1971 Morgan WW, Mizell S

Report Name Daily fluctuations of DNA synthesis in the corneas of *Rana pipiens*

Publication Comp Biochem Physiol A Comp Physiol

Issue-page numbers Oct;40(2):487-93.

URL <http://www.ncbi.nlm.nih.gov/pubmed/4400945>

Abstract N/A

Keywords

Authors William W. Morgan†, Sherwin Mizell

Year 1971 Morgan WW, Mizell S

Report Name Diurnal fluctuation in dna content and DNA synthesis in the dorsal epidermis of *Rana pipiens*

Publication Comparative Biochemistry and Physiology Part A: Physiology

Issue-page numbers Volume 38, Issue 3, 1 March 1971, Pages 591-602

URL <http://www.sciencedirect.com/science/article/pii/0300962971901265>

Abstract #
1. □1. DNA content and DNA synthesis (3H-thymidine uptake) were measured in dorsal skin epidermis of frogs—*Rana pipiens* sacrificed in groups of 12 over a period of 24 hr—exposed to a 12 : 12 light-dark lighting régime for 2 weeks before sacrifice.

2. □2. Diurnal fluctuations were observed in both DNA content and DNA synthesis of dorsal epidermis.

3. □3. The reproducibility of these rhythms suggests that they are true physiological phenomena with periodicities of nearly 24 hr.

4. □4. The results of light inversion experiments suggest the importance of the lighting régime in the regulation of these rhythms.

Keywords Circadian rhythm; diurnal fluctuations; DNA content; DNA synthesis; rhythms; 3H-thymidine uptake; growth; lighting régime

Authors L.M. Mortensen, R. Moe

Year 1983 Mortensen LM, Moe R

Report Name Growth responses of some greenhouse plants to environment. VI. Effect of CO₂ and artificial light on growth of *Chrysanthemum morifolium* Ramat

Publication Scientia Horticulturae

Issue-page numbers Volume 19, Issues 1-2, March 1983, Pages 141-147

URL <http://www.sciencedirect.com/science/article/pii/0304423883900547>

Abstract Rooted cuttings of *Chrysanthemum morifolium* 'Horim' were grown for 32 days in long days at 3 CO₂ levels (330, 1000 or 1600 µl l⁻¹) and at 4 light levels (44, 129, 268 or 395 µE m⁻² s⁻¹). The effect of CO₂ enrichment on shoot dry weight was 27–60%. A positive interaction between CO₂ and light was observed. Application of CO₂ increased relative growth rate about 16%, resulting in 5 days enhancement of growth. Shoot length, number of leaves, and growth of lateral breaks were all increased by CO₂ and light. No significant effects were obtained by raising CO₂ concentration from 1000 to 1600 µl l⁻¹.

Keywords

Authors Keith A. Mott and David Peak

Year 2011 Mott KA, Peak D

Report Name Alternative perspective on the control of transpiration by radiation

Publication PNAS

Issue-page numbers Published online before print November 21, 2011, doi: 10.1073/pnas.1113878108

URL <http://www.pnas.org/content/early/2011/11/16/1113878108.short>

Abstract Stomatal responses to light are important determinants for plant water use efficiency and for general circulation models, but a mechanistic understanding of these responses remains elusive. A recent study [Pieruschka R, Huber G, Berry JA (2010) Proc Natl Acad Sci USA 107:13372–13377] concluded that stomata respond to total absorbed radiation rather than red and blue light as previously thought. We tested this idea by reexamining stomatal responses to red and blue light and to IR radiation. We show that responses to red and blue light are not consistent with a response to total absorbed radiation and that apparent stomatal responses to IR radiation are explainable as experimental artifacts. In addition, our data and analysis provide a method for accurately determining the internal temperature of a leaf.

Keywords

Authors P L Munday, G P Jones, M C Öhman, U L Kaly
Year 1998 Munday PL, Jones GP, Öhman MC, Kaly UL
Report Name Enhancement of recruitment to coral reefs using light-attractors
Publication Bulletin of Marine Science
Issue-page numbers Volume: 63, Issue: 3, Pages: 581-588
URL <http://www.mendeley.com/research/enhancement-recruitment-coral-reefs-using-lightattractors/>

Abstract Methods that enhance larval settlement are required to examine the importance of recruitment in the dynamics of coral reef fish populations. Although it is known that larval reef fishes are attracted to light, here we show for the first time that a light-attraction device positioned above patch reefs at Lizard Island (Great Barrier Reef) significantly increased the number of fish settling on the reefs below. The device was a modified light trap with a tube allowing the vertical movement of larvae from the trap to the reef. The number of species of settling fishes, and the abundance and diversity of immigrant fishes were also greater on the light-enhanced reefs. By comparison, the alternative technique of enhancing recruitment using surface buoys moored to reefs was unsuccessful. Further studies are now required to determine whether enhanced recruitment using light-attractors leads to a longer-term increase in population size, as opposed to temporarily concentrating juveniles on the reef.

Keywords

Authors Muntz, W. R. A
Year 1962 Muntz WRA
Report Name Effectiveness of different colors of light in releasing positive phototactic behavior of frogs, and a possible function of the retinal projection to the diencephalon
Publication Neurophysiol
Issue-page numbers November 1, 1962 25:(6) 712-720
URL <http://jn.physiology.org/content/25/6/712.full.pdf>
Abstract N/A
Keywords

Authors Kristen J. Navara, Randy J. Nelson

Year 2007 Navara KJ, Nelson RJ

Report Name The dark side of light at night: physiological, epidemiological, and ecological consequences

Publication Journal of Pineal Research

Issue-page numbers Volume 43, Issue 3, pages 215–224, October 2007

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-079X.2007.00473.x/abstract>

Abstract Organisms must adapt to the temporal characteristics of their surroundings to successfully survive and reproduce. Variation in the daily light cycle, for example, acts through endocrine and neurobiological mechanisms to control several downstream physiological and behavioral processes. Interruptions in normal circadian light cycles and the resulting disruption of normal melatonin rhythms cause widespread disruptive effects involving multiple body systems, the results of which can have serious medical consequences for individuals, as well as large-scale ecological implications for populations. With the invention of electrical lights about a century ago, the temporal organization of the environment has been drastically altered for many species, including humans. In addition to the incidental exposure to light at night through light pollution, humans also engage in increasing amounts of shift-work, resulting in repeated and often long-term circadian disruption. The increasing prevalence of exposure to light at night has significant social, ecological, behavioral, and health consequences that are only now becoming apparent. This review addresses the complicated web of potential behavioral and physiological consequences resulting from exposure to light at night, as well as the large-scale medical and ecological implications that may result.

Keywords cancer; endocrine disruptor; immune; light pollution; melatonin

Authors Rim Nefissi, Yu Natsui, Kana Miyata, Abdelwahed Ghorbel, Tsuyoshi Mizoguchi

Year 2011 Nefissi R, Natsui Y, Miyata K, et al.

Report Name Chapter 11 – Roles of Circadian Clock in Developmental Controls and Stress Responses in Arabidopsis: Exploring a Link for Three Components of Clock Function in Arabidopsis

Publication Advances in Botanical Research

Issue-page numbers Volume 57, 2011, Pages 377–403

URL <http://www.sciencedirect.com/science/article/pii/B9780123876928000114>

Abstract Genetic analysis of the early flowering 3 (*elf3*) mutant of *Arabidopsis thaliana* indicates that ELF3 plays key roles in the regulation of plant morphology, flowering time and stress response, all of which are controlled by circadian clock. Although ELF3 appears to have multiple functions and has been shown to interact physically with the photoreceptor phyB, its ability to regulate several distinct signalling pathways has not been elucidated. This lack of information is attributable in part to the uniqueness of the ELF3 gene, which encodes a novel nuclear protein with no significant sequence similarity to any characterized protein in the existing public databases. Further, little is known about direct protein–protein interactions of ELF3, or about mutations that suppress *elf3* phenotypes. Therefore, it is difficult to hypothesize about potential factors downstream of ELF3. In this chapter, we summarize recent progress on the characterization of ELF3 and discuss potential roles of ELF3 in plants. Several reports have demonstrated that a circadian clock affects stress responses in *Arabidopsis* and that DREB1A/CBF3 mediates between the clock and cold-inducible gene expression. Therefore, possible roles of clock genes such as ELF3, PRRs, LHY and CCA1 in the environmental stress responses of *Arabidopsis* are also discussed.

Keywords Arabidopsis; Circadian clock; Development control; Stress response; ELF3

Authors Negro, J. J., J. Bustamante, et al.

Year 2000 Negro JJ, Bustamante J, et al.

Report Name Nocturnal activity of Lesser Kestrels under artificial lighting conditions in Seville, Spain

Publication Journal of Raptor Research

Issue-page numbers 34(4):327-329

URL <http://elibrary.unm.edu/sora/jrr/v034n04/p00327-p00329.pdf>

Abstract

Lesser Kestrels (*Falco naumanni*) are migratory, colonial small falcons. Kestrels in western European populations breed mainly in holes and crevices in large historic buildings within towns and villages, or often in abandoned farm houses scattered across the countryside (Cramp and Simmons 1980, González and Merino 1990, Negro 1997). The species is considered Endangered in western Europe (Biber 1994).

In the city of Seville in southern Spain, three Lesser Kestrel colonies remain in the downtown area. To our knowledge, no other city in western Europe as large as Seville (population 750 000) currently has Lesser Kestrel colonies. In Seville, the main colony of about 70 pairs is located in the Cathedral. This Gothic building is the largest cathedral in Spain and third largest in the Christian world. One smaller colony is located in El Salvador (25 pairs), a Baroque church nicknamed Seville's second cathedral located about 500 m away from the Cathedral itself, and another is at Montesión (7-10 pairs), a small chapel about 1.5 km from the Cathedral (C. Melguizo and J.L. Ruiz unpubl. data). The size of the city's population of Lesser Kestrels has not changed significantly in the last 10 years (JJ. Negro, C. Melguizo, and J.L. Ruiz unpubl. data), although the kestrels were surely more abundant in the past, when numerous breeding colonies thrived in different city buildings (González and Merino 1990). Reports from the early 1970s (Andrada and Franco 1974) indicate that Lesser Kestrels were active at night around the Cathedral, where they apparently took advantage of the powerful ornamental illumination that highlighted this historic building. However, no systematic study was ever conducted to determine whether Lesser Kestrels were active at night on a regular basis at the Cathedral or at other locations in the city. The fraction of birds involved in nocturnal behavior was also unknown, although Andrada and Franco (1974) suggested that up to 50% of individuals in the Cathedral could be active on any given night. The goals of our work were to: (1) determine if Lesser Kestrels were active every night under ornamental lights, (2) determine which fraction of the colony was active at night, (3) determine the function of nocturnal activity, and (4) describe this unusual

behavior in a typically diurnal species. In addition, prey deliveries by adults were recorded at selected nests during day- and night-time hours to determine the relative contribution of nocturnal activities in raising nestlings

Keywords Lesser Kestrel; Falco naumanni; nocturnal activity;

Authors Nein, R.

Year 0 Nein R

Report Name A Robin uses artificial light for feeding at night

Publication Beitrage zur Naturkunde der Wetterau

Issue-page numbers 9(2):213

URL

Abstract

Keywords

Authors Nemeth, R. S. and J. J. Anderson

Year 1992 Nemeth RS, Anderson JJ

Report Name Response of juvenile coho and chinook salmon to strobe and mercury vapor lights

Publication North American Journal of Fisheries Management

Issue-page numbers 12(4):684-692

URL <http://www.tandfonline.com/doi/abs/10.1577/1548-8675%281992%29012%3C0684%3AR0JCAC%3E2.3.CO%3B2>

Abstract Species-specific responses to flashing (strobe) and nonflashing (mercury vapor) lights were monitored in hatchery-reared juveniles of coho salmon *Oncorhynchus kisutch* and chinook salmon *O. tshawytscha*. Fish behaviors were characterized as attraction and avoidance responses, and as active, passive, and hiding behaviors. We investigated how basic fish behavior and activity changed when fish held under a variety of ambient light conditions were exposed to strobe and mercury light. Implications of how these behaviors may influence migrating smolts at a fish bypass system were discussed. Both chinook and coho salmon avoided strobe and full-intensity mercury light, but chinook salmon exhibited an attraction to dim mercury light. Coho and chinook salmon showed different behavior patterns under most conditions when exposed to strobe and mercury light: coho salmon hid 47% of the time, whereas chinook salmon swam actively 74% of the time. The greatest change produced by either of the stimulus lights was at night when both species normally were passive; exposure to mercury light at nighttime increased fish activity by 90%. Both species also showed similarities in their levels of excitability (e.g., sudden or explosive movements in otherwise sedentary behaviors). The results of this study showed that the behaviors were reproducible: more than 80% of the fish exhibited the same behavior during specific environmental conditions, and sudden and infrequent behaviors were strongly associated with these behavior categories. The behaviors observed in our experimental environment may give insight as to how changes in light relate to fish behavior in bypass systems.

Keywords

Authors Nikolaus, G.
Year 1980 Nikolaus G
Report Name An Experiment to Attract Migrating Birds with Car Headlights in the Chyulu Hills, Kenya
Publication Scopus
Issue-page numbers 4(2):45-46
URL N/A
Abstract N/A
Keywords

Authors Nikolaus, G. and D.J. Pearson.
Year 1983 Nikolaus G, Pearson DJ
Report Name Attraction of Nocturnal Migrants to Car Headlights in the Sudan Red Sea Hills
Publication Scopus
Issue-page numbers 7(1):19-20
URL N/A
Abstract N/A
Keywords

Authors HEIMO L. NILSSON and MAGNUS LINDSTRÖM

Year 1983 Nilsson HL, Lindstrom M

Report Name Retinal damage and sensitivity loss of a light-sensitive crustacean compound eye (*Cirolana borealis*), Electron microscopy and electrophysiology

Publication J Exp Biol

Issue-page numbers 107, 277-292

URL <http://jeb.biologists.org/content/107/1/277>

Abstract

1. The compound eye of the deep-water-living crustacean *Cirolana borealis* has been exposed to measured amounts of white light, and the effects have been analysed by electron microscopy and electrophysiology (ERG).
2. The threshold for damage of the retinula cells lies between 1171 lx (0.47 Wm⁻²) and 1250 lx (4.9 Wm⁻²). With daylight exposures of more than 70 W m⁻², there is severe structural derangement and the amplitude of the electroretinogram (ERG) is abolished.
3. No recovery of the retinula cell organization or of the ERG occurs after daylight exposure and a dark period of up to 5 days.
4. A novel type of photoreceptor membrane shedding is described for both dark-adapted and light-exposed eyes.
5. Hence, morphologically and functionally, the *Cirolana* eye is strictly adapted to a dim-light environment and is destroyed by too intense illumination.

Keywords

Authors Noakes, D. L. G

Year 1991 Noakes DLG

Report Name Ontogeny of behaviour in cichlids. pp: 209 - 224. In: M. H. A. Keenleyside (editor)

Publication Cichlid fishes: behaviour, ecology and evolution

Issue-page numbers Croom-Helm, London

URL http://books.google.com/books?id=9bXmVlbR1iAC&pg=PR16&lpg=PR16&dq=The+Biology+of+Cichlid+Fishes+Keenleyside&source=bl&ots=y_mv7oOTqje&sig=GsglpPhRZEh3

Abstract Book

Keywords

Authors Noakes, D. L. G
Year 1992 Noakes DLG
Report Name Behaviour and rhythms in fishes. pp. 39-50. In: M. A. Ali (editor), Rhythms in Fishes
Publication Rhythms in Fishes
Issue-page numbers Plenum Press, New York
URL <http://books.google.com/books?id=mOIAzjAiSDsC&pg=PA135&lpg=PA135&dq=Behaviour+and+rhythms+in+fishes&source=bl&ots=1xmtA64yOi&sig=gyp8YfcynINy--TII4IVyCBo>
Abstract Book
Keywords

Authors Noakes, D. L. G., Baylis, J. R
Year 1990 Noakes DLG, Baylis JR
Report Name Fish Behavior
Publication Chapter 17, pp. 553-585. In: P. B. Moyle & C. B. Schreck (editors). Handbook of Fish Biology.
Issue-page numbers American Fisheries Society, Bethesda, Maryland.
URL N/A
Abstract Book
Keywords

Authors Joseph J. Nocera and Stephen W. Kress

Year 1996 Nocera JJ, Kress SW

Report Name Nocturnal predation on common terns by great black-backed gulls

Publication Colonial Waterbirds

Issue-page numbers Vol. 19, No. 2 (1996), pp. 277-279

URL <http://www.jstor.org/pss/1521872>

Abstract We observed nocturnal predation by Great Black-backed Gulls (*Larus marinus*) on eggs and chicks of Common Terns (*Sterna hirundo*) at a restored tern colony on the coast of southern Maine. Dissection of a nocturnal predatory gull in 1994 revealed two 7d old chicks, 3 embryonic chicks and 5 eggs. Further observations implicating nocturnal predation by gulls on tern eggs in 1995 confirmed that Great Black-backed Gulls can raid tern nesting colonies during moderate to low nocturnal light conditions.

Keywords

Authors Terry M. Norton, Michael T. Walsh

Year 2012 Norton TM, Walsh MT

Report Name Chapter 31 - Sea Turtle Rehabilitation

Publication Fowler's Zoo and Wild Animal Medicine Current Therapy

Issue-page numbers 2012, Pages 239-246

URL <http://www.sciencedirect.com/science/article/pii/B9781437719864000317>

Abstract There are seven living species of sea turtles, including the flatback (*Natator depressus*), green sea turtle (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's Ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and olive Ridley (*Lepidochelys olivacea*). 17 Sea turtles are found in all oceans except for the Arctic. All species of sea turtles residing in U.S. waters are listed as either "threatened" or "endangered" under the Endangered Species Act (ESA). Significant threats to sea turtle populations include loss of habitat, light pollution, marine debris ingestion or entanglement, contaminant exposure, poaching and legal use of their meat, eggs, and body parts for a variety of purposes, fishery and boat strike mortality, harmful algal blooms, cold stunning, and infectious disease (Fig. 31-1). 17 (See the following websites for further information:

Keywords

Authors L. NOWINSZKY

Year 2004 Nowinszky L

Report Name NOCTURNAL ILLUMINATION AND NIGHT FLYING INSECTS

Publication APPLIED ECOLOGY AND ENVIRONMENTAL RESEARCH

Issue-page numbers 2(1): 17–52

URL <http://www.ecology.kee.hu/pdf/02017052.pdf>

Abstract The present study discusses the light trapping of insects depending on the environmental illumination, twilight polarization phenomena and the moon phases. The trapping data were taken of Hungarian national light-trap network. The important results are the followings: The Babinet-point, a polarization free spot of the sky at twilight, can be a role of orientation of insects. The height of the Moon above the horizon is in negative correlation with the number of the caught insects. The maximum individual number of species was collected at various moon phases.

Keywords light-trap, collecting distance, Babinet-point, moon phases

Authors Kazunari Nozue, Stacey L. Harmer, and Julin N. Maloof

Year 2011 Nozue K, Harmer SL, Maloof JN

Report Name Genomic Analysis of Circadian Clock-, Light-, and Growth-Correlated Genes Reveals PHYTOCHROME-INTERACTING FACTOR5 as a Modulator of Auxin Signaling in Arabidop

Publication Plant Physiol.

Issue-page numbers 2011 May; 156(1): 357–372

URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3091056/>

Abstract Plants exhibit daily rhythms in their growth, providing an ideal system for the study of interactions between environmental stimuli such as light and internal regulators such as the circadian clock. We previously found that two basic loop-helix-loop transcription factors, PHYTOCHROME-INTERACTING FACTOR4 (PIF4) and PIF5, integrate light and circadian clock signaling to generate rhythmic plant growth in Arabidopsis (*Arabidopsis thaliana*). Here, we use expression profiling and real-time growth assays to identify growth regulatory networks downstream of PIF4 and PIF5. Genome-wide analysis of light-, clock-, or growth-correlated genes showed significant overlap between the transcriptomes of clock-, light-, and growth-related pathways. Overrepresentation analysis of growth-correlated genes predicted that the auxin and gibberellic acid (GA) hormone pathways both contribute to diurnal growth control. Indeed, lesions of GA biosynthesis genes retarded rhythmic growth. Surprisingly, GA-responsive genes are not enriched among genes regulated by PIF4 and PIF5, whereas auxin pathway and response genes are. Consistent with this finding, the auxin response is more severely affected than the GA response in *pif4 pif5* double mutants and in PIF5-overexpressing lines. We conclude that at least two downstream modules participate in diurnal rhythmic hypocotyl growth: PIF4 and/or PIF5 modulation of auxin-related pathways and PIF-independent regulation of the GA pathway.

Keywords

Authors C P Nunan, D L Noakes

Year 1985 Nunan CP, Noakes DL

Report Name Light sensitivity and substrate penetration by eleutheroembryos of brook (*Salvelinus fontinalis*) and lake charr (*Salvelinus namaycush*) and their F1 hybrid, splake

Publication Experimental Biology

Issue-page numbers Volume: 44, Issue: 4, Pages: 221-228

URL <http://www.mendeley.com/research/light-sensitivity-and-substrate-penetration-by-eleutheroembryos-of-brook-salvelinus-fontinalis-and-lake-charr-salvelinus-namaycush-and-their->

Abstract Critical light levels necessary to produce avoidance movements in photonegative free embryos (eleutheroembryos) of the lake and brook charr and their F1 hybrid splake, (*S. namaycush* X *S. fontinalis*) were determined and compared to previously studied movement patterns within artificial substrate systems. Light sensitivity was inversely related to depth of penetration into artificial substrates. As well, brook charr held in vertical profile tanks under either 14 : 10 h light : dark cycles or total darkness showed similar movement patterns. These results do not support previous hypotheses concerning the role of ambient light in the initial downward movement of eleutheroembryonic salmonids within spawning redds.

Keywords

Authors Nunan, C. P., Noakes, D. L. G

Year 1989 Nunan CP, Noakes DLG

Report Name The role of spontaneous motor activity and substrate porosity in early behaviour and intrasubstrate movements of salmonid embryos

Publication pp. 42-47. In: E. K. Brannon & B. Jonsson (editors)

Issue-page numbers Migration in Salmon and Trout, University of Washington Press, Seattle

URL N/A

Abstract Book

Keywords

Authors Christopher P. Nunan, David L. G. Noakes

Year 1985 Nunan CP, Noakes DLG

Report Name Response of rainbow trout (*Salmo gairdneri*) embryos to current flow in simulated substrates

Publication Canadian Journal of Zoology

Issue-page numbers 63:(8) 1813-1815, 10.1139/z85-270

URL <http://www.nrcresearchpress.com/doi/abs/10.1139/z85-270>

Abstract Direction of current flow did not affect the movement patterns of rainbow trout embryos maintained in artificial substrate systems. Embryos successfully emerged from the substrate in total darkness, although light has previously been implicated as necessary for emergent behaviour. Neither phototactic or rheotactic behaviour appears necessary for "normal" movement and emergence of salmonid embryos. Movement patterns appear to be primarily due to geotactic-geokinetic behaviour.

Keywords

]. However, bug's attraction to light source was not found sex dependent [

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]. Therefore, this study recommends the use of fluorescent light by households, campgrounds, and other recreational centres that are potentially exposed to the nuisance of the giant water bugs. Otherwise, incandescent light bulbs should be used when it is desired to attract the presence of these aquatic bugs either for food or scientific studies.

Keywords

Authors Yuichi Oba, Takahiko Kainuma

Year 2009 Oba Y, Kainuma T

Report Name Diel changes in the expression of long wavelength-sensitive and ultraviolet-sensitive opsin genes in the Japanese firefly, *Luciola cruciata*

Publication Gene

Issue-page numbers Volume 436, Issues 1-2, 1 May 2009, Pages 66-70

URL <http://www.sciencedirect.com/science/article/pii/S0378111909000584>

Abstract

Sexual communication between male and female fireflies involves the visual detection of bioluminescence. In the present study, we isolated two different types of opsin cDNAs from an adult of the Japanese firefly, *Luciola cruciata*. Phylogenetic analysis indicated that these genes correspond to long wavelength-sensitive and ultraviolet-sensitive opsins. This is in agreement with the prior findings, in which the spectral sensitivity of the *L. cruciata* eye showed two peaks, UV and long wavelength, and the latter substantially matched the bioluminescent spectrum of $\lambda_{max} = 560$ nm. Diel changes in both opsins mRNA levels were determined by quantitative PCR analysis. In adult females, the mRNA level of long wavelength-sensitive opsin was higher at night than in the day, and peaked at 20:00, the time when the luminescence behavior was most active. On the other hand, the expression level of ultraviolet-sensitive opsin was not significantly changed during the day. In adult males, diel changes in the expression of both opsins were not significant. The results suggest that the expression level of "bioluminescence-sensitive" opsins in female *L. cruciata* is linked to their mating behavior.

Keywords

ERG, electroretinogram; LW, long wavelength; ORF, open reading frame; RACE, rapid amplification of cDNA ends; UV, ultraviolet

Authors	Ogden, L. J. E.
Year	1996 Ogden LJE
Report Name	Collision course: the hazards of lighted structures and windows to migrating birds.
Publication	Toronto, World Wildlife Fund Canada and Fatal Light Awareness Program
Issue-page numbers	A special report for World Wildlife Fund Canada and the Fatal Light Awareness Program September 1996
URL	http://www.flap.org/new/ccourse.pdf
Abstract	<p>In an annual ritual observed for millennia, hundreds of millions of birds arrive each spring in Canada to choose their breeding grounds, only to return to warmer climes in autumn. Covering return flight distances of up to 25,000 kilometres, migratory birds make a truly extraordinary effort.</p> <p>Only in this century, and therefore suddenly in evolutionary time-scales, have migrating birds faced collisions with artificial obstacles along their flight paths: buildings and other towering structures covered in glass and lit at night. In the dark, and especially in foggy or rainy weather, the combination of glass and light becomes deadly. Confused by artificial lights, blinded by weather, and unable to see glass, birds by the hundreds and even thousands can be injured or killed in one night at one building. Over 100 different species of birds have collided with buildings in Toronto alone. One expert estimates that across North America, up to 100 million birds die in collisions each year. Many species that collide frequently are known to be in long-term decline and some are already designated officially as threatened.</p> <p>For these reasons, World Wildlife Fund Canada (WWF) and the Fatal Light Awareness Program (FLAP) have formed a new partnership, and jointly published Collision Course: The Hazards of Lighted Structures and Windows to Migrating Birds. Formed in 1993, FLAP continues a 30-year tradition in Toronto of rescuing birds trapped in the city's downtown core following latenight collisions with tall buildings: in the wee hours of the morning, volunteers scour plazas and sidewalks beneath skyscrapers for dead, injured or disoriented birds, and later release the survivors back to the wild. WWF, dedicated to wildlife conservation in both the temperate and tropical worlds, seeks to identify emerging issues and advocate practical solutions for the long-term protection of wildlife at risk.</p> <p>Compared to habitat loss, pollution, and over-hunting, the issue of building collisions is neither well-known nor adequately understood. Yet across North America, more birds die from collisions each year than succumbed to the Exxon Valdez oil spill. As author Lesley J. Evans Ogden points out in Collision Course, bird collisions is a continent-wide issue affecting millions of birds. Her research experience with migratory species, combined with a commitment to conservation, show us what lessons can be learned and applied. In principal, it is delightfully simple to prevent collisions: by night, turn out the lights; by day, make windows visible to birds. In practice, solutions require commitment and action from building owners, managers and tenants in the short-run, and new approaches to office environments by architects, engineers and designers in the long-run. Responding to the call to action in Collision Course, FLAP and WWF will campaign to make Toronto the first "bird-friendly" city in North America. Royal Bank of Canada, which generously sponsored publication of Collision Course, is leading the reform of building management practices in Toronto, with the goal of minimizing escaped light at night and thus bird collisions at the Royal Bank Plaza office towers. When we consider that a bird flying north from the Gulf of Mexico to eastern Canada stands a 70 percent chance of encountering at least one urban area, it is clear that other buildings and other cities must take up the challenge, too. Those who do will find Collision Course their starting point.</p>

Keywords

Authors Ohlendorf R, Vidavski RR, Eldar A, Moffat K, Möglich A.

Year 2012 Ohlendorf R, Vidavski RR, Eldar A, et al.

Report Name From Dusk till Dawn: One-Plasmid Systems for Light-Regulated Gene Expression

Publication J Mol Biol

Issue-page numbers 2012 Jan 8. [Epub ahead of print]

URL <http://www.ncbi.nlm.nih.gov/pubmed/22245580>

Abstract Signaling photoreceptors mediate diverse organismal adaptations in response to light. As light-gated protein switches, signaling photoreceptors provide the basis for optogenetics, a term that refers to the control of organismal physiology and behavior by light. We establish as novel optogenetic tools the plasmids pDusk and pDawn, which employ blue-light photoreceptors to confer light-repressed or light-induced gene expression in *Escherichia coli* with up to 460-fold induction upon illumination. Key features of these systems are low background activity, high dynamic range, spatial control on the 20- μ m scale, independence from exogenous factors, and ease of use. In optogenetic experiments, pDusk and pDawn can be used to specifically perturb individual nodes of signaling networks and interrogate their role. On the preparative scale, pDawn can induce by light the production of recombinant proteins and thus represents a cost-effective and readily automated alternative to conventional induction systems.

Keywords

Authors Steffen Oppel, André F. Raine, John J. Borg, Helen Raine, Elsa Bonnaud, Karen Bourgeois, André R. Breton

Year 2011 Oppel S, Raine AF, Borg JJ, et al.

Report Name Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities?

Publication Biological Conservation

Issue-page numbers Volume 144, Issue 9, September 2011, Pages 2255-2263

URL <http://www.sciencedirect.com/science/article/pii/S0006320711002278>

Abstract Many seabird species are experiencing population declines, with key factors being high adult mortality caused by fishery by-catch and predation by introduced predators on nesting islands. In the Mediterranean, both of these pressures are intensive and widespread. We studied the adult survival of an endemic Mediterranean seabird, the Yelkouan shearwater (*Puffinus yelkouan*), between 1969–1994 and 2007–2010 in Malta and between 2004–2010 in France using mark–recapture methods. Mean annual survival probabilities for breeding adults were below 0.9 for all colonies and periods. Between 1969–1994, annual survival for adults of unknown breeding status was on average 0.74 (95% confidence interval: 0.69–0.80) in Malta, possibly as a result of various human disturbances (including illegal shooting), light pollution and fisheries by-catch. Over the period 2004–2010, we found strong support for variation in adult survival probabilities between breeders and non-breeders, and islands with and without introduced predators in France. Survival probabilities for non-breeders (0.95, 0.81–1.0) appeared to be higher than for breeders (0.82, 0.70–0.94), but were imprecise partly due to low recapture probabilities. In Malta, we found evidence for heterogeneity in survival probabilities between two unknown groups (probably breeders and non-breeders), and seasonal variation in survival probability. Birds were more likely to survive the period including the peak breeding season than an equally long period during which they roam widely at sea. Although annual adult survival probability was still low (0.85, 0.58–1.0), colony protection measures appear to have reduced mortality at nesting cliffs. A population model indicated that colonies in France and Malta would currently require continuous immigration of 5–12 pairs per year to maintain stable populations. Our estimates of adult survival probabilities over the past four decades are consistent with overall population declines. Threats to Yelkouan shearwaters require immediate management actions to avoid ongoing population declines in the western Mediterranean.

Keywords Fishery by-catch; Population model; Seabird; Introduced predator; Multi-state model; Mediterranean; Shooting

Authors Outen, A

Year 1998 Outen A

Report Name The possible ecological implication of artificial lighting

Publication Hertfordshire, UK

Issue-page numbers Hertfordshire Biological Records Centre.

URL N/A

Abstract N/A

Keywords

Authors Rohit Kumar Pandey and Sanjay Kumar Bhardwaj

Year 0 Pandey RK, Bhardwaj SK

Report Name Circadian and Seasonal Responses in Indian Weaver Bird: Subjective Interpretation of Day and Night Depends Upon Both Light Intensity and Contrast Between Illuminations

Publication Chronobiology International

Issue-page numbers Ahead of Print : Pages 1-6

URL <http://informahealthcare.com/doi/full/10.3109/07420528.2011.603873>

Abstract This study investigated whether changes in illumination modify perception of day and night conditions in a diurnal species, the Indian weaver bird. Birds were initially subjected to a 12-h light:12-h dark regime (12L:12D; L = 20 lux, D = 0.5 lux). After every 2 wks, the combinations of light illumination in L and D phases were changed as follows: 20:2 lux, 20:5 lux, 20:10 lux, 20:20 lux, 20:100 lux, and 20:200 lux. Finally, birds were released into dim constant light (0.5 lux) for 2 wks to determine the phase and period of the circadian activity rhythm. They were also laparotomized at periodic intervals to examine the effects of the light regimes on the seasonal testicular cycle. All individuals showed a consistently similar response. As evident by the activity pattern under these light regimes, both in total activity during contrasting light phases and during the 24 h in the beginning and end of first light phase, birds interpreted the period of higher light intensity as day, and the period of lower intensity as the night. During the period of similar light intensity, i.e., under LL, birds free-ran with a circadian period (24 h). In bright LL (20 lux), the activity rhythm was less distinct, but periodogram analysis revealed the circadian period for the group as 24.46 ± 0.41 h (mean ± SE). However, in dim LL at the end of the experiment, all birds exhibited a circadian pattern with average period of 25.52 ± 0.70 h. All birds also showed testicular growth and regression during the 16-wks study. It is suggested that weaver birds interpret day and night subjectively based on both the light intensity and contrast between illuminations during two phases over the 24 h.

Keywords Circadian rhythm, Indian weaver bird, Light intensity, Locomotor activity, Zeitgeber time

Authors GJ Partridge, DD Benetti, JD Stieglitz, J Hutapea, MCINTYRE A., CHEN B.; HUTCHINSON W.; SCHOLEY V. P.

Year 2011 Partridge GJ, Benetti DD, Stieglitz JD, et a;/

Report Name The effect of a 24-hour photoperiod on the survival, growth and swim bladder inflation of pre-flexion yellowfin tuna (*Thunnus albacares*) larvae

Publication Aquaculture

Issue-page numbers 2011, vol. 318, no3-4, pp. 471-474 [4 page(s) (article)] (3/4 p.)

URL <http://cat.inist.fr/?aModele=afficheN&cpsidt=24340515>

Abstract The effects of two different continuous photoperiod regimes on survival, growth and swim bladder inflation of pre-flexion yellowfin tuna (*Thunnus albacares*) larvae were investigated. Each photoperiod regime was tested twice with a different larval cohort to confirm the observed results. Trials 1 and 2 tested the effect of a reduced night-time light intensity (10 μ moles $m^{-2}s^{-1}$ = 30% of the daytime intensity) and found that those larvae reared for 8 days under the 24 h lighting (24-L) photoperiod exhibited a slight improvement in survival compared to those reared under the control photoperiod of 12 h light (12-L), however these improvements were not significant. In addition, those larvae reared under this photoperiod regime were equal in length to those in the control. Trials 3 and 4 compared the same variables in larvae reared under a continuous photoperiod (24-L) with a constant light intensity of 30 μ moles $m^{-2}s^{-1}$, against those reared under the aforementioned 12-L photoperiod. Survival of larvae under the continuous photoperiods were $9 \pm 1\%$ ($n = 2$) and $10 \pm 2\%$ ($n=3$) for Trials 3 and 4, respectively, compared to less than 1% in both control treatments; differences that in both cases were highly significant. In addition, in both trials larvae cultured under the 24-L photoperiod were significantly larger and exhibited more advanced development than those reared under the 12-L photoperiod, however swim bladder inflation was significantly lower. We suggest that the improved survival and growth achieved under a continuous photoperiod is due to the extended foraging time combined with the prevention of mortality caused by night-time sinking.

Keywords

Authors Pascoe, P.L.

Year 1990 Pascoe PL

Report Name Light and capture of marine animals

Publication in: Herring, P.J., Campbell, A.K., Whitfield, M. and Maddock, L. (eds), Light and Life in the Sea

Issue-page numbers Cambridge Univ. Press, 357 pp

URL <http://www.cambridge.org/aus/catalogue/catalogue.asp?isbn=9780521105484&ss=exc>

Abstract N/A

Keywords

Authors Passell, H., J.A. Rosenfield, and K.H. Gaines

Year 0 Passell H, Rosenfield JA, Gaines KH

Report Name Ecological impacts on ocelot, jaruarundi, and other species, from increased human activity in critical riparian habitat

Publication The Southwest Biodiversity Initiative

Issue-page numbers Albuquerque, NM

URL N/A

Abstract N/A

Keywords

Authors A.M. Paterson, G.P. Pearce

Year 1990 Paterson AM, Pearce GP

Report Name Attainment of puberty in domestic gilts reared under long-day or short-day artificial light regimens

Publication Animal Reproduction Science

Issue-page numbers Volume 23, Issue 2, September 1990, Pages 135-144

URL <http://www.sciencedirect.com/science/article/pii/037843209090055K>

Abstract The effect of photoperiod on attainment of puberty was examined in four studies using controlled long- or short-day light regimens. Gilts were reared together under natural photoperiod until divided between two controlled environment rooms at a mean age of 106.6 ± 0.52 days on 25 September 1987 (Study 1, n = 32) or 23 March 1988 (Study 2, n = 26). In Study 3 (21 September 1988; n = 35) and Study 4 (21 March 1989; n = 36) the gilts were transferred to the controlled environment rooms at 56.5 ± 0.82 days of age. In all studies the light: dark ratio was initially 12 h light: 12 h dark (12 L: 12 D) in both rooms and it was then either increased or decreased by 10–15 min per week. In Studies 1 and 2 the ratio was increased to 16 L: 8 D or decreased to 8 L: 16 D over 16 weeks. In Studies 3 and 4 it was increased to 14.5 L: 9.5 D or decreased to 9.5 L: 14.5 D over 12 weeks then returned to 12 L: 12 D over a further 12 weeks. Temperature was maintained at 23°C. In Studies 1 and 2 all gilts commenced daily exposure to mature boars at 173.5 ± 0.52 days of age and 82.9 ± 1.63 kg. In Studies 3 and 4 all gilts remained isolated from boars.

In Studies 1 and 2 the light regimens during rearing had no significant effect on either the proportion of gilts which reached puberty in response to boars or the interval from first exposure to boars until puberty (overall, long-day View the MathML source; short-day View the MathML source). However, when gilts remained isolated from boars more of those housed under the short-day regimens reached puberty in both Study 3 (View the MathML source vs. View the MathML source) and Study 4 (View the MathML source vs. View the MathML source). The mean age at puberty was 209.3 ± 3.13 days in Study 3 and 214 ± 2.61 in Study 4. These data, obtained from gilts housed at constant cool temperatures under controlled light regimens which closely mimicked natural photoperiods, show conclusively that long days are inhibitory to attainment of puberty in the gilt. This finding provides compelling evidence that photoperiod is the major environmental factor responsible for the delay in puberty often seen during the summer under field conditions.

Keywords

Authors Elena Patriarca, Paolo Debernardi

Year 2010 Patriarca E, Debernardi P

Report Name Bats and light pollution

Publication <http://www.centroregionalechiroterri.org/>

Issue-page numbers

URL <http://www.centroregionalechiroterri.org/download/eurobats/Bats%20and%20light%20pollution.pdf>

Abstract Throughout evolution living organisms have adapted to the natural variations in available light. In the last 150-200 years, however, artificial light has profoundly changed nighttime light conditions. These changes affect both terrestrial and aquatic habitats and have potentially very widespread consequences on wildlife, which are difficult to characterise precisely. It also must be said that very little study has been dedicated to the subject, which results in poor knowledge on the real effects of artificial light on organisms, species and ecosystems. This document will discuss the relationship between artificial light and bats, with the inclusion of considerations about insects, due to their being bat's main food source. We will summarise the information available, and will evidence potential problems relative to the critical aspects that have so far not been dealt with sufficiently, in so as not to let us evaluate their actual relevance to the problem objectively and fully. We will propose measures which could be adopted in order to minimise certified or potential problems (the precautionary principle obliges to take also the latter into account), and we will formulate suggestions to better the legal framework. Among mammals, bats (chiroptera) represent one of the orders with the richest number of species (in Italy it is the richest). Bats are particularly exposed to light pollution due to their nocturnal habits. They have a high conservation interest (many species are threatened) and an important ecological role (being the principal predators of nighttime insects). Insects make up the zoological class with the greatest number of species, most of which are nocturnal. They are the organisms that have the biggest impact on the functions of terrestrial ecosystems due to their many ecological roles (pollinators, prey, predators, decomposers, leaf eaters, etc.).

Keywords

Authors A. S. Pearse

Year 1910 Pearse AS

Report Name The reactions of Amphibians to light

Publication Proceedings of the American Academy of Arts and Sciences

Issue-page numbers 161-208

URL <http://www.jstor.org/stable/20022529>

Abstract N/A

Keywords

Authors Elizabeth K. Perkin, Franz Hölker, John S. Richardson, Jon P. Sadler, Christian Wolter and Klement Tockner

Year 2011 Perkin EK, Hölker F, Richardson JS, et al.

Report Name The influence of artificial light on stream and riparian ecosystems: questions, challenges, and perspectives

Publication Ecosphere

Issue-page numbers 2:art122. [doi:10.1890/ES11-00241.1]

URL <http://www.esajournals.org/doi/abs/10.1890/ES11-00241.1>

Abstract Artificial light at night is gaining attention for its potential to alter ecosystems. Although terrestrial ecologists have observed that artificial light at night may disrupt migrations, feeding, and other important ecological functions, we know comparatively little about the role artificial light might play in disrupting freshwater and riparian ecosystems. We identify and discuss four future research domains that artificial light may influence in freshwater and associated terrestrial ecosystems, with an emphasis on running waters: (1) dispersal, (2) population genetics and evolution, (3) ecosystem functioning, and (4) potential interactions with other stressors. We suggest that future experimental and modeling studies should focus on the effects of different spectral emissions by different light sources on freshwater organisms, the spatial and temporal scale over which artificial light acts, and the magnitude of change in light at night across the landscape relative to the distribution of running and standing waters. Improved knowledge about the effects of artificial light on freshwater ecosystems will inform policy decisions about changes to artificial light spectral emissions and distributions.

Keywords aquatic invertebrates, artificial illumination, ecosystems, fish, multiple stressors, riparian, streams, urbanization

Authors Sarah Perreault, M. Ather Ali, Skúli Skúlason and David L. G. Noakes

Year 1990 Perreault S, Ali MA, Skúlason S, Noakes DLG

Report Name Constancy of synaptic ribbon numbers in the retina of the arctic charr, *Salvelinus alpinus*

Publication Environmental Biology of Fishes

Issue-page numbers Volume 27, Number 2, 131-137, DOI: 10.1007/BF00001942

URL <http://www.springerlink.com/content/w80qj13321m7616u/>

Abstract At high latitudes, such as in Iceland, the daily photoperiod varies from almost continuous darkness in winter to virtually constant light in summer. Previous studies of detailed retinal structure in vertebrates have shown significant daily and annual effects of photoperiod. We sampled arctic charr in Iceland during the summer, including fish that were both light- and dark-adapted, during both day and night. We observed retinomotor responses characteristic of light- and dark-adaptation, but found no difference in the number of synaptic ribbons in the retina. The morpho-physiological changes, appearing as retinomotor responses, are thus not expressed at the synaptic level.

Keywords Diurnal - Histology - Photoperiod - Cones - Rods - Ultrastructure - Fish vision

Authors Perry, G. and D.W. Buden

Year 1999 Perry G, Buden DW

Report Name Ecology behavior and color variation of the green tree skink, Lamprolepis smaragdina (Lacertilla: Scincidae), in Micronesia

Publication Micronesia

Issue-page numbers 31(2): 263-273

URL <http://www.nw.ttu.edu/perry/Reprints/99%20Lamprolepis.pdf>

Abstract We studied populations of the green tree skink, ...

Keywords

Authors Peters, A. and K. J. F. Verhoeven

Year 1994 Peters A, Verhoeven KJF

Report Name Impact of artificial lighting on the seaward orientation of hatchling loggerhead turtles

Publication Journal of Herpetology

Issue-page numbers 28(1): 112-114

URL <http://www.jstor.org/pss/1564691>

Abstract N/A

Keywords

Authors	Aili Petersen
Year	2001 Petersen A
Report Name	Night Lights
Publication	American Scientist
Issue-page numbers	January-February 2001
URL	https://www.americanscientist.org/issues/pub/night-lights

Abstract Thanks to the creators of the incandescent filament lamp, we are able today to illuminate our streets, homes and businesses with the flip of a switch, thereby extending the "day" long past sundown. Yet turning night into day has not been without its drawbacks. Astronomers decry excessive light levels for obstructing the view of the skies. The International Dark-Sky Association seeks to educate the public about light pollution—the unnatural luminescence created by a combination of urban sky glow and glare—which it calls a "growing threat to the nighttime environment."

Keywords

Authors	Anna Pfeifer, Tilo Mathes, Yinghong Lu, Peter Hegemann and Tilman Kottke
Year	2010 Pfeifer A, Mathes T, Lu Y, et al.
Report Name	Blue Light Induces Global and Localized Conformational Changes in the Kinase Domain of Full-Length Phototropin
Publication	Biochemistry
Issue-page numbers	2010, 49 (5), pp 1024–1032 DOI: 10.1021/bi9016044
URL	http://pubs.acs.org/doi/abs/10.1021/bi9016044

Abstract The blue-light photoreceptor phototropin plays a crucial role in optimizing photosynthesis in plants. In the two light-, oxygen-, or voltage-sensitive (LOV) domains of phototropin, the light stimulus is absorbed by the flavin chromophores. The signal is assumed to be transferred via dissociation and unfolding of a conserved J α helix element to the serine/threonine kinase domain. We investigated full-length phototropin from the green alga *Chlamydomonas reinhardtii* by Fourier transform infrared spectroscopy to shed light on the signal transfer within the protein and on the structural response of the kinase. Light-induced structural changes were assigned by comparing signals of the full-length protein with those of the truncated LOV1-LOV2-J α and LOV1-LOV2 and with those of deletion mutants. A loss of helicity originating from the J α linker helix was observed in LOV1-LOV2-J α in agreement with previous studies of LOV2-J α . Full-length phototropin showed reversible global conformational changes via several turn elements. These changes were suppressed in a deletion mutant lacking the J α linker and are attributed to the kinase domain. The loss of turn structure is interpreted as a light-induced opening of the kinase tertiary structure upon release of the LOV2 domain. Concomitant protonation changes of Asp or Glu residues in the kinase domain were not observed. A light-induced loss in helicity was observed only in the presence of a phototropin-characteristic 54-amino acid extension of the kinase activation loop, which is predicted to be located apart from the catalytic cleft. This response of the extension might play a significant role in the phototropin signaling process.

Keywords

Authors Pierce, S.M. and M.V. Moore

Year 1998 Pierce SM, Moore MV

Report Name Light pollution affects the diel vertical migration of freshwater zooplankton

Publication Abstract, 1998. Annual Meeting of the Ecological Society of America

Issue-page numbers Baltimore, MD

URL N/A

Abstract N/A

Keywords

Authors Richard Podolsky, David G. Ainley, Gregory Spencer, Leah Deforest and Nadav Nur

Year 1988 Podolsky R, Ainley DG, Spencer G, et al.

Report Name Mortality of Newell's shearwaters caused by collisions with urban structures on Kauai

Publication Colonial Waterbirds

Issue-page numbers Vol. 21, No. 1 (1998), pp. 20-34

URL <http://www.jstor.org/pss/1521727>

Abstract We investigated the population ecology of Newell's Shearwaters (*Puffinus auricularis newelli*) on the island of Kauai, May-November 1993 and 1994. Reported here are (1) mortality rates of adults and subadults caused by collisions with power lines during summer 1993-1994; (2) mortality rates of fledglings as a result of collisions with power lines and other structures in autumn 1993-1994; (3) calibration of adult and fledgling mortality in the data collected by the Save Our Shearwaters (SOS) program, 1987-1994, using the quantified search effort in 1993-1994; and (4) characteristics of power lines that lead to mortality of adults, subadults and fledglings. SOS rehabilitates fledglings grounded after attraction to lights, a phenomenon called "fallout." Our work was confined to eastern and southern Kauai, where ca. 3,000 shearwater pairs breed. In this area, we estimated that at least 70 breeding adult and 280 subadult shearwaters die each year as a result of collisions with power lines during summer. In the same area, at least 340 fledglings die each autumn. Autumn fallout (and mortality) of fledglings was spread among coastal, urban areas, but summer mortality of adults/subadults was confined, with 74% of deaths occurring at <9% of the coastal power lines (about 7.5 km total). Few adults and no subadults died during autumn. Autumn mortality of fledglings (and fallout in general) increased with greater proximity to bright lights and with the number and (top to bottom) spread of lines in power line arrays. Summer adult/subadult mortality was not correlated to lighting but was correlated to the number and spread of lines, especially where lines were strung across major river valleys. Lack of low vegetation under the lines also increased the number of dead birds found in both seasons. We suggest that in southern and eastern Kauai, (1) mortality as a result of collisions with power lines is significant; (2) fallout involves fledglings that successfully fly to sea but are then attracted back to land by coastal lights; and (3) a large proportion of adult shearwaters use specific river valley flyways to pass to and from colonies.

Keywords

Authors	T. Polak, C. Korine, S. Yair, M. W. Holderied
Year	2011 Polak T, Korine C, Yair S, Holderied MW
Report Name	Differential effects of artificial lighting on flight and foraging behaviour of two sympatric bat species in a desert
Publication	Journal of Zoology
Issue-page numbers	Volume 285, Issue 1, pages 21–27, September 2011
URL	http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7998.2011.00808.x/abstract;jsessionid=6F841DA2FF086637CB4B979228B8CC68.d02t03
Abstract	Human habitation in deserts can create rich novel resources that may be used by native desert species. However, at night such resources may lose attractiveness when they are in artificially lit areas. For bats, attraction to such manmade habitats might be species specific. In an isolated village in the Negev desert that is known for its high bat activity we investigated the effects of artificial lighting on flight behaviour of two aerial insectivorous bat species: <i>Pipistrellus kuhlii</i> , a non-desert synanthropic bat, common in urban environments and <i>Eptesicus bottae</i> , a desert-dwelling species. Using an acoustic tracking system we reconstructed flight trajectories for bats that flew under artificial lights [Light treatment (L)] versus in natural darkness [Dark treatment (D)]. Under L both <i>P. kuhlii</i> and <i>E. bottae</i> flew significantly faster than under D. Under L, <i>P. kuhlii</i> also flew at significantly lower altitude (i.e. away from a floodlight) than under D. Whereas <i>P. kuhlii</i> foraged both in L and D, <i>E. bottae</i> only foraged in D. In L, activity of <i>E. bottae</i> decreased and it merely transited the illuminated area at commuting rather than foraging speed. Thus, under artificially lighted conditions the non-desert synanthropic species may have a competitive advantage over the native desert species and may outcompete it for aerial insect prey. Controlling light pollution in deserts and keeping important foraging sites unlit may reduce the synanthropic species' competitive advantage over native desert bats.
Keywords	light pollution; desert bats; <i>Eptesicus bottae</i> ; flight behaviour; <i>Pipistrellus kuhlii</i>

Authors Fernando E. Prado, Mariana Rosa, Carolina Prado, Griselda Podazza, Roque Interdonato, Juan A. González and Mirna Hilal

Year 0 Prado FE, Rosa M, Prado C, et al.

Report Name UV-B Radiation, Its Effects and Defense Mechanisms in Terrestrial Plants

Publication Environmental Adaptations and Stress Tolerance of Plants in the Era of Climate Change

Issue-page numbers 2012, 57-83, DOI: 10.1007/978-1-4614-0815-4_3

URL <http://www.springerlink.com/content/jg47q0p137287185/>

Abstract The UV-B is an important component of solar radiation to which all terrestrial and aquatic plants were exposed during the early evolutionary phase of the Earth. Hence the plants, principally terrestrial, have evolved different mechanisms to avoid and repair the UV-B damage; therefore, it is not surprising that photomorphogenic responses to the solar UV-B are erroneously assumed to be adaptations to the harmful UV radiation. The responses to UV-B enhancement include changes in the leaf area, leaf thickness, stomatal density, wax deposition, stem elongation, and branching pattern, as well as in the synthesis of secondary metabolites, alterations in plant-pathogen and plant-predator interactions, and in gene expression. However, under field conditions the ambient solar UV-B provides an important signal for the normal plant development and may be perceived by the plants through nondestructive processes involving both UV-B specific and UV-B nonspecific signaling pathways. The specific signaling pathways include the components UVR8 and COP1 which regulate the expression of a set of genes that are essential for the plants' protection. The nonspecific signaling pathways involve DNA damage, reactive oxygen species (ROS), hormones, and wound/defense signaling molecules. Indeed under the field conditions, the ambient UV-B might more properly be viewed as a photomorphogenic signal than as a stressor. Therefore, it might not be appropriate to evaluate the adaptive roles of plant responses to UV-B cues upon stress tolerance by the simultaneous application of both solar radiation and supplemental UV-B. In this chapter, we analyzed the information regarding physiological and morphogenic responses of the terrestrial plants to the UV-B radiation, as well as the events related to UV-B perception, signal transduction, gene expression, and ROS formation from different studies carried out in greenhouses, growth chambers, and field conditions.

Keywords UV-B radiation - DNA damage - DNA repair - Metabolites - Signaling - Secondary metabolites - Morphogenic responses

Authors O. Rabazaa, D. Galadí-Enríquez, A. Espín Estrella, F. Aznar Dols

Year 2010 Rabazaa O, Galadí-Enríquez D, Estrella AE, Dols FA

Report Name All-Sky brightness monitoring of light pollution with astronomical methods

Publication Journal of Environmental Management

Issue-page numbers Volume 91, Issue 6, June 2010, Pages 1278-1287

URL <http://www.sciencedirect.com/science/article/pii/S0301479710000307>

Abstract This paper describes a mobile prototype and a protocol to measure light pollution based on astronomical methods. The prototype takes three all-sky images using BVR filters of the Johnson-Cousins astronomical photometric system. The stars are then identified in the images of the Hipparcos and General Catalogue of Photometric Data II astronomical catalogues, and are used as calibration sources. This method permits the measurement of night-sky brightness and facilitates an estimate of which fraction is due to the light up-scattered in the atmosphere by a wide variety of man-made sources. This is achieved by our software, which compares the sky background flux to that of many stars of known brightness. The reduced weight and dimensions of the prototype allow the user to make measurements from virtually any location. This prototype is capable of measuring the sky distribution of light pollution, and also provides an accurate estimate of the background flux at each photometric band.

Keywords Light pollution; All-sky camera; Photometric bands; Astronomy

Authors Raevel P. & Lamiot, F

Year 1998 Raevel P, Lamiot F

Report Name Impacts écologiques de l'éclairage nocturne

Publication Premier Congrès européen sur la protection du ciel nocturne

Issue-page numbers June 30-May 1, Cité des Sciences, La Villette, Paris

URL <http://www.um.es/eubacteria/Euroregion.pdf>

Abstract N/A

Keywords

Authors Rand, A. S., M. E. Bridarolli, L. Dries, and M. J. Ryan

Year 1997 Rand AS, Bridarolli ME, Dries L, Ryan MJ

Report Name Light levels influence female choice in Túngara frogs: predation risk assessment?

Publication Copeia

Issue-page numbers 447-450

URL <http://www.sbs.utexas.edu/ryan/Publications/1997/1997Copeia97-447.pdf>

Abstract N/A

Keywords

Authors Ranford, R.B., Mason, J.E.

Year 0 Ranford RB, Mason JE

Report Name Nocturnal migrants mortalities at the Toronto-Dominion Centre

Publication The Ontario Field Biologist

Issue-page numbers 23, 26-29

URL N/A

Abstract N/A

Keywords

Authors Orly Razgour, Julia Hanmer, Gareth Jones

Year 2011 Razgour O, Hanmer J, Jones G

Report Name Using multi-scale modelling to predict habitat suitability for species of conservation concern: The grey long-eared bat as a case study

Publication Biological Conservation

Issue-page numbers In Press, Corrected Proof

URL <http://www.sciencedirect.com/science/article/pii/S0006320711003181>

Abstract Although spatial scale is important for understanding ecological processes and guiding conservation planning, studies combining a range of scales are rare. Habitat suitability modelling has been used traditionally to study broad-scale patterns of species distribution but can also be applied to address conservation needs at finer scales. We studied the ability of presence-only species distribution modelling to predict patterns of habitat selection at broad and fine spatial scales for one of the rarest mammals in the UK, the grey long-eared bat (*Plecotus austriacus*). Models were constructed with Maxent using broad-scale distribution data from across the UK (excluding Northern Ireland) and fine-scale radio-tracking data from bats at one colony. Fine-scale model predictions were evaluated with radio-tracking locations from bats from a distant colony, and compared with results of traditional radio-tracking data analysis methods (compositional analysis of habitat selection). Broad-scale models indicated that winter temperature, summer precipitation and land cover were the most important variables limiting the distribution of the grey long-eared bat in the UK. Fine-scale models predicted that proximity to unimproved grasslands and distance to suburban areas determine foraging habitat suitability around maternity colonies, while compositional analysis also identified unimproved grasslands as the most preferred foraging habitat type. This strong association with unimproved lowland grasslands highlights the potential importance of changes in agricultural practices in the past century for wildlife conservation. Hence, multi-scale models offer an important tool for identifying conservation requirements at the fine landscape level that can guide national-level conservation management practices.

Keywords Chiroptera; Maxent; Radio-tracking; Species distribution modelling; Rare species

Authors RCEP

Year 2009 RCEP

Report Name Artificial Light in the Environment

Publication The Royal Commission on Environmental Pollution

Issue-page numbers

URL <http://www.official-documents.gov.uk/document/other/9780108508547/9780108508547.pdf>

Abstract Imagine a vista of outstanding natural beauty, to say nothing of historic and cultural significance, permanently obscured from public view by a cloud of non-toxic, but visually impenetrable, artificial vapour. Such a prospect seems unthinkable in Britain today. Yet we seem to tolerate the daily destruction of arguably the most culturally universal and historically pristine of natural vistas – the night sky, filled with constellations of stars, and planets and galaxies. The responsible pollutant, however, is not an impenetrable vapour, but the light that we so freely emit into our surroundings.

Keywords

Authors Jonathan R. Reed

Year 1987 Reed JR

Report Name Polarizing Filters Fail to Reduce Light Attraction in Newell's Shearwaters

Publication Wildlife Society Bulletin

Issue-page numbers Vol. 15, No. 4 (Winter, 1987), pp. 596-598

URL <http://www.jstor.org/pss/3782590>

Abstract Many species of seabirds are attracted to lights...

Keywords

Authors Jonathan Rodgers Reed
Year 1986 Reed JR
Report Name Seabird Vision: Spectral Sensitivity and Light Attraction Behavior
Publication Thesis (Ph. D.)--University of Wisconsin--Madison
Issue-page numbers Dissertation
URL <http://www.worldcat.org/title/seabird-vision-spectral-sensitivity-and-light-attraction-behavior/oclc/13942316>
Abstract N/A
Keywords

Authors Reed, J. R.
Year 1985 Reed JR
Report Name Seabird Vision: Spectral Sensitivity and Light Attraction Behavior
Publication Abstract in Int. B. Sci. Eng.
Issue-page numbers 47(4), 1452
URL N/A
Abstract N/A
Keywords

Authors Jonathan R Reed, John L Sincock, Jack P Hailman

Year 1985 Reed JR, Sincock JL, Hailman JP

Report Name Light attraction in endangered procellariiform birds: Reduction by shielding upward radiation

Publication The Auk

Issue-page numbers Volume: 102, Issue: 2, Publisher: University of California Press on behalf of the American Ornithologists' Union, Pages: 377-383

URL <http://www.mendeley.com/research/light-attraction-endangered-procellariiform-birds-reduction-shielding-upward-radiation/>

Abstract Autumnal attraction to man-made lighting causes heavy mortality in fledgling Hawaiian seabirds: Newell's Shearwater (*Puffinus auricularis newelli*), Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*) and, Band-rumped Storm-Petrel (*Oceanodroma castro*). These threatened, endangered, and rare species (respectively) approach and circle lights on their first flight from mountain nesting colonies on the island of Kauai to the sea. We shielded lights of the largest resort to prevent upward radiation on alternate nights during two fledgling seasons. Shielding decreased attraction by nearly 40%. Most attraction occurred 1-4 h after sunset. Full moon dramatically decreased attraction, a phenomenon that has both theoretical and management implications.

Keywords

Authors Paul M. Regular, April Hedd, and William A. Montevecchi

Year 2011 Regular PM, Hedd A, Montevecchi WA

Report Name Fishing in the Dark: A Pursuit-Diving Seabird Modifies Foraging Behaviour in Response to Nocturnal Light Levels

Publication PLoS One

Issue-page numbers 6(10): e26763.

URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3202575/>

Abstract Visual predators tend not to hunt during periods when efficiency is compromised by low light levels. Yet common murre, a species considered a diurnal visual predator, frequently dive at night. To study foraging of murre under different light conditions, we used a combination of archival tagging methods and astronomical models to assess relationships between diving behaviour and light availability. During diurnal and crepuscular periods, murre used a wide range of the water column (2–177 m), foraging across light intensities that spanned several orders of magnitude (10^3 – 10^{-10} Wm^{-2}). Through these periods, they readily dived under conditions equivalent to ambient moonlight (10^{-4} – 4 Wm^{-2}) but rarely under conditions equivalent to starlight (10^{-8} – 8 Wm^{-2}). At night, murre readily foraged during both moonlit and starlit periods, and diving depth and efficiency increased with nocturnal light intensity, suggesting that night diving is at least partially visually guided. Whether visually guided foraging is possible during starlit periods is less clear. Given the dense prey landscape available, random-walk simulations suggest that murre could benefit from random prey encounters. We hypothesise that murre foraging through starlit periods rely either on close-range visual or possibly nonvisual cues to acquire randomly encountered prey. This research highlights the flexibility of breeding common murre and raises questions about the strategies and mechanisms birds use to find prey under very low light conditions.

Keywords

Authors Russel J. Reiter, CA Dan-Xian Tan and Lucien C. Manchester

Year 2012 Reiter RJ, Tan CAD, Manchester LC

Report Name MELATONIN IN FISH: CIRCADIAN RHYTHM AND FUNCTIONS pg 71

Publication Biological Clock In Fish Editors:

Issue-page numbers CRC Press ISBN 978-1-57808-675-7

URL <http://ruangbacafmipa.staff.ub.ac.id/files/2012/02/Biological-Clock-in-Fish.pdf> - page=82

Abstract Melatonin (N-acetyl-5-methoxytryptamine) was isolated from bovine pineal tissue and chemically characterized by a group of dermatologists (Lerner et al., 1958, 1959) five decades ago who intended to use it in the treatment of pigmentary skin disorders. These studies were initiated because of a discovery 50 years earlier that something of pineal origin had a powerful blanching effect in the skin of tadpoles (McCord and Allen, 1917). At the time of melatonin's discovery, there was widespread agreement among scientists that the pineal gland was a non-functional neural vestige. Since the characterization of melatonin, its synthesis in the pineal of all species has been documented and, because of its almost exclusive production at night, it is known as the chemical expression of darkness (Reiter, 1991). The light:dark dependency of the melatonin rhythm also has been characterized in a variety of fish species as in other classes of vertebrates (Bromage et al., 2001; Nikaido et al., 2009).

Keywords

Authors Reynolds, W. W., D. A. Thompson, and M. E. Casterlin

Year 1977 Reynolds WW, Thompson DA, Casterlin ME

Report Name Responses of young California grunion, *Leuresthes tenuis*, gradients of temperature and light

Publication Copeia

Issue-page numbers 1977(1):144-149.

URL <http://www.jstor.org/pss/1443517>

Abstract In a laboratory temperature gradient, young California grunion, *Leuresthes tenuis*, exhibited a final modal preferendum of 25 C, 7 C lower than the final preferendum of young *L. sardina* from the Gulf of California. No circadian rhythms in thermal preference were found, and the final preferendum was unaffected by acclimation temperature. Like *L. sardina*, young *L. tenuis* were strongly attracted to bright light (10000 lux). In a simultaneous opposed gradient of temperature and light, the fish spent more time at the preferred temperature than at the preferred light intensity. The laboratory results are discussed in relation to observed field distribution and geographic range.

Keywords

Authors Rich & Longcore
Year 2006 Rich C, Longcore T
Report Name Ecological Consequences of Artificial Night Lighting
Publication Island Press, Washington
Issue-page numbers Book
URL <http://www.urbanwildlands.org/ecanlbook.html>
Abstract N/A
Keywords

Authors C.F. Curtis Riley
Year 1913 Riley CFC
Report Name Responses of young toads to light and contact
Publication Journal of Animal Behavior
Issue-page numbers Volume 3, Issue 3, May-June 1913, Pages 179-214
URL <http://www.sciencedirect.com/science/article/pii/S0095992807600843>
Abstract Investigated the reaction of toads to light and contact. A series of experiments were conducted on 12 toads in a dark room at an approximate temperature of 22 °c. Responses were measured upon exposure to the following conditions: Intense and less intense artificial light, strong and weak diffused daylight, sunlight, colored light and contact. Comparisons were made with frogs. Concluded that the toads responded negatively to intense artificial light, but positively to all other conditions of light exposure, moving towards the illumination source in a comparatively straight path. Light intensity and ray direction in the field were important factors in the photic reactions. The Ss exposed to light also reacted to contact stimuli by giving motor responses. When handled with undue pressure and roughness, they reacted with the death-feigning response, in which they acquired a particular motionless body response.
Keywords

Authors W.D. Riley, B. Bendall, M.J. Ives, N.J. Edmonds, D.L. Maxwell

Year 2011 Riley WD, Bendall B, Ives MJ, et al.

Report Name Street lighting disrupts the diel migratory pattern of wild Atlantic salmon, *Salmo salar* L., smolts leaving their natal stream

Publication Aquaculture

Issue-page numbers Available online 20 December 2011

URL <http://www.sciencedirect.com/science/article/pii/S0044848611009690>

Abstract The migratory timing and behaviour of wild Atlantic salmon smolts leaving their natal stream was determined using a passive integrated transponder (PIT) antennae system at a study site on a tributary of the River Itchen, England. Experiments compared the downstream migration of smolts under natural control conditions (2000–2006) with two years (2008 & 2009) when the main downstream exit of the study site was subject to street-lit conditions every alternate night (maximum light intensity measured at the stream surface = 14 lux). Migration of smolts under control conditions was significantly ($p < 0.01$, $n = 170$) correlated with sunset. By contrast, street lighting resulted in the timing of migration being random ($p = 0.11$, $n = 7$; $p = 0.76$, $n = 34$, respectively) with respect to time of day. Furthermore, migration of smolts was significantly ($p = 0.01$, $n = 19$) correlated with the time of sunset for fish migrating when the lamp had been off, but random ($p = 0.36$, $n = 22$) when the lamp had been on (2008 & 2009 data, combined). This alteration in migratory behaviour due to street lighting may impact fitness.

Keywords

Authors E. Robinson, A. R. Jerrett, S. E. Black, W. Davison

Year 2011 Robinson E, Jerrett AR, Black SE, Davison W

Report Name Visual acuity of snapper *Pagrus auratus*: effect of size and spectral composition

Publication Journal of Fish Biology

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1095-8649.2011.03130.x/full>

Abstract Visual acuity of the commercially important sparid *Pagrus auratus* was tested using the optomotor response. Juvenile fish were categorized by size as group 1 (50 g), group 2 (100 g), group 3 (150 g), group 4 (300 g), group 5 (500 g) and group 6 (800 g). Group 3 fish demonstrated excellent visual acuity (minimum separable angle, MSA, 1°), which was improved compared with the smaller fish groups (groups 1 and 2, MSA, 2°). In the larger fish groups, however, a reduction in visual acuity was observed (groups 4, 5 and 6 MSA, 4°). Group 2 (100 g) fish displayed positive optomotor responses in long wavelength light (red) but reduced responses in short wavelengths (blue). Red light sensitivity is beneficial for the estuarine lifestyle of these fish, where light is predominantly at long wavelengths. In contrast, group 6 (800 g) fish displayed improved acuity in blue and green light and reduced acuity in red light. Fish of this size move away from the estuary to open oceans, where light is predominantly in the shorter wavelengths (blue-green). These results support the sensitivity hypothesis for the relationship between fish visual systems and the light environment they inhabit.

Keywords eye; light wavelength; optomotor response; vision; visual acuity

Authors Pedro Rodrigues, Christoph Aubrecht, Artur Gil, Travis Longcore and Chris Elvidge

Year 2011 Rodrigues P, Aubrecht C, Gil A, et al.

Report Name Remote sensing to map influence of light pollution on Cory's shearwater in São Miguel Island, Azores Archipelago

Publication European Journal of Wildlife Research

Issue-page numbers DOI: 10.1007/s10344-011-0555-5

URL <http://www.springerlink.com/content/bq76251234776x14/>

Abstract Global economic and population growth increase the extent and intensity of artificial night lighting. From an ecological perspective, this is light pollution, which causes changes in reproductive physiology, migration and foraging of many species and ultimately leads to loss of biodiversity. Some seabirds are intimately linked with the light features of their environments because they are nocturnally active. We report light-induced groundings of Cory's shearwater (*Calonectris diomedea*) during a 2-year study (2008 and 2009) in São Miguel Island, in the Azores archipelago, and investigate the spatial correlation of locations of grounded birds with an annual composite of remotely sensed stable lights. Results indicate that 16.7% of fledglings are attracted to lights. The exposure of shearwater colonies in the study area to artificial night lighting is low overall. Four colonies account for 87% of the grounded birds. The distance each bird was found from the closest colony was best explained by the ratio of the satellite-measured light levels at the grounding spot to the light levels at the assigned colony of origin. These results demonstrate that satellite-observed nighttime lights are sufficient to assess risk to marine birds at the scale of oceanic islands and indicate their utility for monitoring the effectiveness of programs to manage lighting to reduce risk for these species and conducting global assessments of species vulnerability. To minimize the impact on Cory's shearwater and other marine birds, we recommend measures such as reduction and control of lighting intensity near colony locations, while continuing and re-enforcing rescue campaigns.

Keywords Light pollution, Marine birds, Remote sensing, Ground collection data, Azores Islands

Authors AIRAM RODRÍGUEZ, BENEHARO RODRÍGUEZ

Year 2009 Rodríguez A, Rodríguez B

Report Name Attraction of petrels to artificial lights in the Canary Islands: effects of the moon phase and age class

Publication Ibis

Issue-page numbers Volume 151, Issue 2, pages 299–310, April 2009

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1474-919X.2009.00925.x/abstract>

Abstract The extent and intensity of artificial night lighting has increased with urban development worldwide. The resulting light pollution is responsible for mortality among many Procellariiformes species which show nocturnal activity on their breeding grounds. Here, we report light-induced mortality of Procellariiformes during a 9-year study (1998–2006) on Tenerife, the largest island of the Canary archipelago. A total of 9880 birds from nine species were found grounded, the majority being Cory's Shearwaters *Calonectris diomedea* (93.4%). For this species the majority of grounded birds were fledglings (96.4%), which fall apparently while leaving their nesting colony for the first time; for the smaller species (storm-petrels) adult birds were more often grounded than fledglings. For almost all species, grounding showed a seasonal pattern linked with their breeding cycle. Certain phases of the moon influenced grounding of Cory's Shearwater, with the extent of grounding being reduced during phases of full moon. The percentage of fledglings attracted to lights in relation to the fledglings produced annually varied between species and years (0–1.3% for the Madeiran Storm-petrel *Oceanodroma castro*; 41–71% for Cory's Shearwater). Mean adult mortality rates also varied between species (from 0.4% for the European Storm-petrel *Hydrobates pelagicus* and the Cory's Shearwater, to 2.3% for the Manx Shearwater *Puffinus puffinus*). Here we show that light-induced mortality rates are of concern, at least for petrels and small shearwaters. Thanks to efforts involving civil cooperation, 95% of grounded birds have been returned to the wild. To minimize the impact of artificial lights on petrels we recommend several conservation measures: continuing rescue campaigns, alteration of light signatures and reduction of light emissions during the fledging peaks. Furthermore, we recommend that a monitoring program for petrel populations be implemented, as well as further studies to assess the fate of released fledglings and continued research to address why petrels are attracted to lights.

Keywords anthropogenic perturbation; Atlantic Ocean; light pollution; moonlight; seabirds

Authors A. Rodríguez, B. Rodríguez, Á. J. Curbelo, A. Pérez, S. Marrero, J. J. Negro

Year 2012 Rodríguez A, Rodríguez B, Curbelo ÁJ, et al.

Report Name Factors affecting mortality of shearwaters stranded by light pollution

Publication Animal Conservation

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-1795.2012.00544.x/abstract;jsessionid=425F2644FABF04AF505153951EB7CF11.d03t02?deniedAccessCustomisedMessage=&>

Abstract Every year and across the world, thousands of fledglings of different petrel species crash into human structures because they are disorientated by artificial lights during their first flights. As this phenomenon is rather predictable, rescue campaigns are organized to help birds to reach the ocean, but unfortunately, a low proportion gets hurt or dies. Despite the huge number of affected individuals, and the fact that the problem was detected a long time ago, little is known on this source of mortality. We have studied the factors (i.e. body condition, plumage development, fledging date and sex) influencing the mortality of Cory's Shearwater *Calonectris diomedea* fledglings stranded inland due to light pollution in Tenerife (Canary Islands) during two consecutive breeding seasons (2009 and 2010). Late fledglings showed lower values of a body condition index than early ones. No sex biases were detected, neither considering stranded birds overall, nor for recovery dates or in the body condition of rescued fledglings. Our results indicate that late birds stranded by lights showing abundant down are more susceptible to fatal collisions and that the lights do not selectively kill birds with lower body condition indices. An enhancement of veterinary care should be done during the last part of the fledging period when more fatal collisions occur, especially focused on fledglings with abundant down. More research to determine why some individuals end up disoriented around artificial lights and others do not is urgently needed to minimize or prevent fallouts.

Keywords body condition; *Calonectris diomedea*; Canary Islands; illumination; light pollution; mortality; sex ratio

Authors AIRAM RODRÍGUEZ, BENEHARO RODRÍGUEZ, MATTHEW P. LUCAS

Year 2011 Rodríguez A, Rodríguez B, Lucas MP

Report Name Trends in numbers of petrels attracted to artificial lights suggest population declines in Tenerife, Canary Islands

Publication Ibis

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1474-919X.2011.01175.x/full>

Abstract The secretive breeding behaviour of petrels makes monitoring their breeding populations challenging. To assess population trends of Cory's Shearwater *Calonectris diomedea*, Bulwer's Petrel *Bulweria bulwerii* and Macaronesian Shearwater *Puffinus baroli* in Tenerife from 1990 to 2010, we used data from rescue campaigns that aim to reduce the mortality of fledgling petrels attracted to artificial lights as proxies for trends in breeding population size. Despite increases in human population size and light pollution, the number of rescued fledglings of Cory's Shearwater and Bulwer's Petrel increased and remained stable, respectively, whereas numbers of rescued Macaronesian Shearwaters sharply declined. In the absence of more accurate population estimates, these results suggest a worrying decline in the Macaronesian Shearwater's breeding population.

Keywords Canary Islands; light pollution; population size; rescue campaigns; seabirds

Authors Rohrbaugh, R. W. Jr., Yahner, R. H.

Year 1997 Rohrbaugh RW, Yahner RH

Report Name Effects of Macrohabitat and Microhabitat on Nest-box Use and Nesting Success of American Kestrels

Publication Wilson Bulletin

Issue-page numbers 109(3), 410-423

URL <http://elibrary.unm.edu/sora/Wilson/v109n03/p0410-p0423.pdf>

Abstract We studied the nesting ecology of American Kestrels (*F&o sparverius*) in Berks and Lehigh Counties, Pennsylvania, from 1987-1991. Kestrels used 99 (76%) of 130 nest boxes dispersed throughout a 1000~km² study area. A total of 259 nesting attempts was noted: 67, 53, 49, 3.5, and 55 in 1987, 1988, 1989, 1990, and 1991, respectively. Of the 259 nesting attempts, 124 (49%) successfully fledged at least one offspring. We measured five macrohabitat and 14 microhabitat variables at the 130 nest boxes. Ten (53%) variables were correlated to levels of nest-box use and nesting success. Kestrels most frequently used nest boxes with high nestling-light intensity ($P = 0.02$) and low nest-box concealment ($P = 0.05$). Frequently used boxes were associated with extremely open habitat dominated by herbaceous vegetation ($P < 0.005$). Nesting kestrels avoided using boxes associated with dense habitats, such as late-successional old fields. Frequently used nest boxes were farther from forested areas than unused boxes ($P = 0.05$). Nest boxes with southeast orientations were used more frequently than expected ($P < 0.025$), and all other orientations were used in proportion to availability. Kestrels had the greatest nesting success when using nest boxes with high selection-light intensities ($P = 0.05$). Received 12 Dec. 1996, accepted 25 Mar. 1997.

Keywords

Authors Roman A.

Year 1995 Roman A

Report Name Inquinamento luminoso e probabili effetti sulle piante (in italian)

Publication Thesis, Univ. Padova

Issue-page numbers Thesis

URL N/A

Abstract N/A

Keywords

Authors Roman, A., Cinzano, P., Giacometti, G. M., & Giulini, P.

Year 2000 Roman A, Cinzano P, Giacometti GM, Giulini P

Report Name Light pollution and possible effects on higher plants

Publication Memorie della Società Astronomia Italiana

Issue-page numbers Vol. 71, p.59

URL <http://adsabs.harvard.edu/full/2000MmSAI..71...59R>

Abstract Light pollution is a well known problem for astronomic observation of the sky...

Keywords

Authors Ross AW, Helfer G, Russell L, Darras VM, Morgan PJ

Year 2011 Ross AW, Helfer G, Russell L, et al.

Report Name Thyroid Hormone Signalling Genes Are Regulated by Photoperiod in the Hypothalamus of F344 Rats.

Publication PLoS ONE

Issue-page numbers 6(6): e21351. doi:10.1371/journal.pone.0021351

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0021351>

Abstract Seasonal animals adapt their physiology and behaviour in anticipation of climate change to optimise survival of their offspring. Intra-hypothalamic thyroid hormone signalling plays an important role in seasonal responses in mammals and birds. In the F344 rat, photoperiod stimulates profound changes in food intake, body weight and reproductive status. Previous investigations of the F344 rat have suggested a role for thyroid hormone metabolism, but have only considered Dio2 expression, which was elevated in long day photoperiods. Microarray analysis was used to identify time-dependent changes in photoperiod responsive genes, which may underlie the photoperiod-dependent phenotypes of the juvenile F344 rat. The most significant changes are those related to thyroid hormone metabolism and transport. Using photoperiod manipulations and melatonin injections into long day photoperiod (LD) rats to mimic short day (SD), we show photoinduction and photosuppression gene expression profiles and melatonin responsiveness of genes by in situ hybridization; TSH β , CGA, Dio2 and Oatp1c1 genes were all elevated in LD whilst in SD, Dio3 and MCT-8 mRNA were increased. NPY was elevated in SD whilst GALP increased in LD. The photoinduction and photosuppression profiles for GALP were compared to that of GHRH with GALP expression following GHRH temporally. We also reveal gene sets involved in photoperiodic responses, including retinoic acid and Wnt/ β -catenin signalling. This study extends our knowledge of hypothalamic regulation by photoperiod, by revealing large temporal changes in expression of thyroid hormone signalling genes following photoperiod switch. Surprisingly, large changes in hypothalamic thyroid hormone levels or TRH expression were not detected. Expression of NPY and GALP, two genes known to regulate GHRH, were also changed by photoperiod. Whether these genes could provide links between thyroid hormone signalling and the regulation of the growth axis remains to be investigated.

Keywords

Authors Ross, R.C.

Year 1946 Ross RC

Report Name People in glass houses should draw their shades

Publication Condor

Issue-page numbers 48, 142

URL N/A

Abstract N/A

Keywords

Authors Shay Rotics, Tamar Dayan, and Noga Kronfeld-Schor

Year 2011 Rotics S, Dayan T, Kronfeld-Schor N

Report Name Effect of artificial night lighting on temporally partitioned spiny mice

Publication Journal of Mammalogy

Issue-page numbers February 2011, Vol. 92, No. 1, pp. 159-168

URL <http://pinnacle.allenpress.com/doi/abs/10.1644/10-MAMM-A-112.1?journalCode=mamm>

Abstract We studied the effect of ecological light pollution on a rocky desert community, focusing on 2 spiny mouse congeners, nocturnal *Acomys cahirinus* (common spiny mouse) and diurnal *Acomys russatus* (golden spiny mouse). We hypothesized that in response to artificial illumination *A. cahirinus* will decrease its activity and *A. russatus* will increase its activity, and thus temporal overlap and interspecific competition could increase. Our study took place in 4 field enclosures: the 1st and 3rd months were controls with natural light, and in the 2nd month artificial illumination, simulating low levels of light pollution, was set for the first 3 h of the night. We implanted temperature-sensitive radiotransmitters to monitor mouse activity, and individual identification tags with automonitored foraging patches were used to track foraging behavior. *A. cahirinus* decreased activity and foraging with artificial lighting, restricting movement particularly in less-sheltered microhabitats, probably because of increased predation risk. Because illumination restricted both activity time and space, intraspecific encounters of *A. cahirinus* over foraging patches increased during and following the illuminated hours. However, diurnal *A. russatus* did not expand its activity into the illuminated hours, possibly due to the presence of competing *A. cahirinus*, or to nonfavorable environmental conditions. Therefore, overt interspecific competition was not affected by experimental light pollution. Light pollution had a negative influence by reducing overall activity and producing a relatively underexploited temporal niche, which may promote invasion of alien species that are less light sensitive; and by increasing intraspecific overlap in foraging *A. cahirinus*.

Keywords *Acomys cahirinus*, *Acomys russatus*, activity patterns, light night niche, light pollution

Authors J.D. Roussel, T.E. Patrick, H.C. Kellgren, C.P. Breidenstein

Year 1963 Roussel JD, Patrick TE, Kellgren HC, Breidenstein CP

Report Name Effect of Artificial Light, Temperature, and Humidity on Physiological Response of Dairy Bulls

Publication Journal of Dairy Science

Issue-page numbers Volume 46, Issue 10, October 1963, Pages 1125-1131

URL <http://www.sciencedirect.com/science/article/pii/S0022030263892206>

Abstract Reproductive and physiological responses of 12 mature dairy bulls were measured under varying artificial incandescent illumination, temperature, and humidity conditions. Bulls in Group I were housed in one-half of a large barn (control), and Group II in the remaining half of the barn, with the addition of incandescent light. Bulls in Group III were housed in an environmental control chamber maintained at 64 F, 15 mm Hg vapor pressure (humidity) and controlled incandescent light. Significant differences ($P < 0.01$) in favor of the bulls exposed to artificial light were attained for initial progressive motility of spermatozoa, morphologically abnormal spermatozoa, livability (72 hr) of spermatozoa, methylene blue reduction time (modified), and percentage of shippable ejaculates. However, no significant differences were attained for concentration of spermatozoa and volume of semen.

The serum protein-bound iodine level declined slightly during the period with 15 hr of light and was essentially equal during the periods with 14 and 16 hr of light. Bulls exposed to artificial light exhibited a significant ($P < 0.01$) decrease in respiration rate as compared with the control. However, there were no significant differences among groups in body temperatures.

Keywords

Authors J.D. Roussel, T.E. Patrick, H.C. Kellgren, A.J. Guidry

Year 1964 Roussel JD, Patrick TE, Kellgren HC, Guidry AJ

Report Name Influence of Incandescent Light on Reproductive and Physiological Responses of Bovine Bulls

Publication Journal of Dairy Science

Issue-page numbers Volume 47, Issue 2, February 1964, Pages 175-178

URL <http://www.sciencedirect.com/science/article/pii/S0022030264886136>

Abstract Two Jersey, four Holstein, two Guernsey, and two Hereford bulls were divided at random into two groups to evaluate the effects of 14 hr of super-imposed incandescent light on semen characteristics and various blood constituents.

Both initial progressive motility and concentration of sperm declined appreciably during the 20 wk following the first of May. However, the decline was significantly less for bulls exposed to supplementary artificial light. Methylene blue reduction time for ejaculates from light-treated bulls remained constant, whereas that for controls increased during the experimental period. There was no change in the volume of semen per ejaculate for either group during the experimental period. The percentage of abnormal sperm increased throughout the experimental period for both treated and control groups.

There were no significant changes in either group, in hemoglobin, hematocrit, erythrocyte count, and leucocyte count. Protein-bound iodine was significantly ($P < 0.05$) higher in the treated group.

Keywords

Authors D.R. Rudell, J.P. Mattheis

Year 2008 Rudell DR, Mattheis JP

Report Name Synergism exists between ethylene and methyl jasmonate in artificial light-induced pigment enhancement of 'Fuji' apple fruit peel

Publication Postharvest Biology and Technology

Issue-page numbers Volume 47, Issue 1, January 2008, Pages 136-140

URL <http://www.sciencedirect.com/science/article/pii/S0925521407002049>

Abstract The pigment content of detached 'Fuji' apple peel was characterized in fruit exposed to ethylene and/or treated with methyl jasmonate (MJ), then irradiated with ultraviolet (UV)/white light. Peel pigments were analyzed using reversed-phase high-performance liquid chromatography coupled with scanning UV-vis absorbance detection. Treatment with MJ alone enhanced anthocyanin content, including idaein, the major anthocyanin in apple fruit. Anthocyanin content was further enhanced by treatment with MJ + ethylene. Treatment with the ethylene action inhibitor 1-MCP plus MJ reduced red coloration compared with MJ alone. Treatment with ethylene or 1-MCP alone, or ethylene + 1-MCP had no effect on anthocyanin accumulation. Production of hyperin, the major quercetin glycoside in peel tissue, was enhanced by MJ and inhibition of ethylene action with 1-MCP enhanced the impact of MJ. 1-MCP with or without MJ increased phloridzin content. Chlorogenic acid synthesis was enhanced following treatment with MJ and/or ethylene, however, treatment with 1-MCP alone or 1-MCP plus MJ resulted in reduced chlorogenic acid content. β -Carotene synthesis increased following MJ plus ethylene, but was not enhanced by MJ or ethylene alone. The results indicate synergistic or additive responses between ethylene and MJ exists for regulation of apple peel pigment synthesis pathways.

Keywords Malus sylvestris var. domestica; Color; Chlorophyll; Carotenoid; Light stress; 1-Methylcyclopropene; Ethylene; Methyl jasmonate

Authors Jens Rydell

Year 1991 Rydell J

Report Name Seasonal use of illuminated areas by foraging northern bats Eptesicus nilssonii.

Publication Ecography

Issue-page numbers Volume 14, Issue 3, pages 203–207, July 1991

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0587.1991.tb00653.x/abstract>

Abstract Foraging northern bats Eptesicus nilssonii were monitored from a car along a 27 km line transect in southern Sweden every week during a 14 month period by means of a bat detector. The number of bats observed along the transect was highly correlated with air temperature, and no bats were observed at temperatures < 6°C. Hence, feeding was infrequent in April and May as well as in September and October and did not occur at all from November to March. In summer, the bats were observed in forest and farmland, but in spring and autumn most bats were detected along rows of street-lights. By attracting insects, artificial lights apparently provide local patches of food for some species of bats during periods which may be critical for their survival and reproduction.

Keywords

<i>Authors</i>	Jens Rydell and Hans J. Baagøe
<i>Year</i>	1996 Rydell J, Baagøe HJ
<i>Report Name</i>	Street lamps increase bat predation on moths
<i>Publication</i>	Entomologisk Tidskrift
<i>Issue-page numbers</i>	117(4): 129-135
<i>URL</i>	N/A

Abstract Streets and roads lit by mercury vapour streetlamps provide important feeding habitats for several species of bats, because the lights attract insects, including moths, which thus become easily accessible to the predators. Some common Scandinavian bat species, mostly the northern bat (*Eptesicus nilssonii*), the particoloured bat (*Vespertilio murinus*) and the serotine (*Eptesicus serotinus*), occur at high densities near streetlights (usually 2-5 bats per km, occasionally up to 20 per km). Bats foraging around streetlights catch male moths in large numbers. The effect of the increased predation on the moth populations is unknown. Mercury vapour lights are currently replaced by environmentally more friendly orange sodium lights in many areas. Sodium lamps do not attract insects to the same extent. The replacement will therefore result in decreased food availability for bats that forage near lights (such as those mentioned above). Our threatened bat species seldom feed near streetlights, and will therefore not be affected directly by the replacement.

Keywords

<i>Authors</i>	Jens Rydell and Hans J. Baagøe
<i>Year</i>	1996 Rydell J, Baagøe HJ
<i>Report Name</i>	Bats & streetlamps
<i>Publication</i>	BATS Magazine
<i>Issue-page numbers</i>	VOLUME 14, NO. 4 Winter 1996
<i>URL</i>	http://www.batcon.org/index.php/media-and-info/bats-archives.html?task=viewArticle&magArticleID=783

Abstract Insectivorous bats are masters at finding concentrations of insects. It makes no difference whether these concentrations are "natural," such as mating swarms of mayflies over water, or "artificial," such as midges swarming at sewage treatment works. One of the most common and plentiful artificial feeding grounds is under streetlamps. As each of us has probably witnessed on our own patio at night, strong lights attract insects, and the insects frequently get trapped in the cone of light projecting out from the lamp. Bats are quick to take advantage of the captive meals any light affords them, and the placement of streetlamps, typically very high up and in the open, creates the ideal dining environment.

Keywords

Authors Salisbury, F.B.

Year 1992 Salisbury FB

Report Name Limiting factors and maximum yields: a controlled ecological life-support system (CELSS)

Publication in: Plant Physiology, eds. Salisbury F.B., Ross, C.W., Wadsworth Publ., Belmont, CA.

Issue-page numbers Book

URL N/A

Abstract N/A

Keywords

Authors Salmon M, Reiners R, Lavin C, Wyneken J

Year 1995 Salmon M, Reiners R, Lavin C, Wyneken J

Report Name Behavior of loggerhead sea turtles on an urban beach. I. Correlates of nest placement

Publication Journal of Herpetology

Issue-page numbers 29(4): 560-567

URL http://www.science.fau.edu/biology/faculty_staff/Wyneken/Urban1.pdf

Abstract ABSTRACT-. Loggerhead sea turtles nesting in Florida sometimes deposit their clutches on urban beaches. This study was undertaken at a city beach to determine correlations between physical variables and where nests were placed. Over a four year period, the distribution of nests on the beach was statistically identical. Nesting density variation at particular sites was unrelated to offshore depth profiles or to beach width, but was strongly correlated with the presence of tall objects (clusters of mature Australian pine trees and rows of multi-storied condominiums) located between the beach and the city. There are no reports that females nest preferentially in front of tall objects (dune or vegetation) at natural rookeries. The response may be unique to urban rookeries where the nesting habitat is exposed to artificial lighting. Tall buildings and trees shielded the beach from city light, with the magnitude of the effect (and the number of nests) positively related to object elevation. Planting vegetation and reestablishing dunes on urban beaches may be effective methods for attracting nesting turtles to these sites.

Keywords

Authors M Salmon, M G Tolbert, D P Painter, M Goff

Year 1995 Salmon M, Tolbert MG, Painter DP, Goff M

Report Name Behavior of loggerhead sea turtles on an urban beach .2. Hatchling orientation

Publication Journal of Herpetology

Issue-page numbers Volume: 29, Issue: 4, Pages: 568-576

URL <http://www.mendeley.com/research/behavior-of-loggerhead-sea-turtles-on-an-urban-beach-ii-hatchling-orientation/>

Abstract At several locations on an urban nesting beach, loggerhead hatchlings emerging from their nests did not orient toward the sea. The cause was city lighting which disrupted normal seafinding behavior. Observations and experiments were conducted to determine why females nested where hatchlings were exposed to illumination, and how hatchlings responded to local conditions. In some cases, females nested late at night after lights were turned off, but hatchlings emerged earlier in the evening when lights were on. In other cases, the beach was shadowed by buildings directly behind the nest, but was exposed to lights from gaps between adjacent buildings. In laboratory tests, "urban silhouettes" (mimicking buildings with light gaps) failed to provide adequate cues for hatchling orientation whereas natural silhouettes (those without light gaps) did. Adding a low light barrier (simulating a dune or dense vegetation) in front of the gaps improved orientation accuracy. The data show that hatchling orientation is a sensitive assay of beach lighting conditions, and that light barriers can make urban beaches safer for emerging hatchlings. At urban beaches where it may be impossible to shield all luminaires, light barriers may be an effective method for protecting turtles.

Keywords

Authors Salmon, M. and B. E. Witherington

Year 1995 Salmon M, Witherington BE

Report Name Artificial lighting and seafinding by loggerhead hatchlings: Evidence for lunar modulation

Publication Copeia

Issue-page numbers 1995(4): 931-938

URL <http://www.jstor.org/pss/1447042>

Abstract Hatchling sea turtles generally emerge from nests at night and crawl immediately toward the ocean ("seafinding orientation"). On natural, dark beaches their orientation is usually appropriate, but where oceanfront buildings are present, hatchlings may crawl toward artificial lighting behind the beach. A systematic survey during the 1993 nesting season documented that, on Florida's beaches, such abnormal behavior ("disrupted orientation") occurred most often on dark nights around new moon and least often under full-moon illumination. Experiments on an urbanized Florida beach (Boca Raton, Palm Beach County) showed that background illumination from the moon, and not an attraction to the moon itself, restored normal seafinding orientation. Background illumination reduced, but did not eliminate, light intensity gradients imposed by artificial lighting. Thus, when seafinding was restored, hatchlings moved toward dimmer, not brighter, horizons. These results suggest that loggerhead hatchlings can locate the sea using mechanisms other than a positive phototaxis (the most widely held view). An alternative hypothesis, supported by these results, is that hatchlings locate the ocean by crawling away from objects behind the beach (dune, vegetation, or buildings) using shape and/or elevation cues.

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Keywords

Authors Gencer Sancar, Cigdem Sancar, Britta Brügger, Nati Ha, Timo Sachsenheimer, Elan Gin, Simon Wdowik, Ingrid Lohmann, Felix Wieland, Thomas Höfer, Axel Diernfellner, Micha

Year 2011 Sancar G, Sancar C, Brügger B, et al.

Report Name A Global Circadian Repressor Controls Antiphase Expression of Metabolic Genes in Neurospora

Publication Molecular Cell

Issue-page numbers Volume 44, Issue 5, 9 December 2011, Pages 687-697

URL <http://www.sciencedirect.com/science/article/pii/S1097276511009026>

Abstract The white-collar complex (WCC), the core transcription factor of the circadian clock of Neurospora, activates morning-specific expression of the transcription repressor CSP1. Newly synthesized CSP1 exists in a transient complex with the corepressor RCM1/RCO1 and the ubiquitin ligase UBR1. CSP1 is rapidly hyperphosphorylated and degraded via UBR1 and its ubiquitin conjugase RAD6. Genes controlled by CSP1 are rhythmically expressed and peak in the evening (i.e., in antiphase to morning-specific genes directly controlled by WCC). Rhythmic expression of these second-tier genes depends crucially on phosphorylation and rapid turnover of CSP1, which ensures tight coupling of CSP1 abundance and function to the circadian activity of WCC. Negative feedback of CSP1 on its own transcription buffers the amplitude of CSP1-dependent oscillations against fluctuations of WCC activity. CSP1 predominantly regulates genes involved in metabolism. It controls ergosterol synthesis and fatty acid desaturases and thereby modulates the lipid composition of membranes.

Keywords

Authors Sanderson, K. and D. Kirkley

Year 1998 Sanderson K, Kirkley D

Report Name Yearly activity patterns of bats at Belair National Park in Adelaide, South Australia

Publication Australian Mammalogy

Issue-page numbers 20:369-375

URL N/A

Abstract N/A

Keywords

Authors Carlos D. Santos, Ana C. Miranda, José P. Granadeiro, Pedro M. Lourenço, Sara Saraiva, Jorge M. Palmeirim

Year 2010 Santos CD, Miranda AC, Granadeiro JP

Report Name Effects of artificial illumination on the nocturnal foraging of waders

Publication Acta Oecologica

Issue-page numbers Volume 36, Issue 2, March-April 2010, Pages 166-172

URL <http://www.sciencedirect.com/science/article/pii/S1146609X09001623>

Abstract Large areas of natural and semi-natural habitats are exposed to artificial illumination from adjacent urban areas and roads. Estuarine and coastal wetlands are particularly exposed to such illumination because shorelines often are heavily utilized by man. However, the impact of artificial illumination on the waders that forage in these highly productive habitats is virtually unknown. We evaluated the effects of artificial illumination on the nocturnal habitat selection and foraging behaviour of six wader species with different feeding strategies: three visual foragers, two species that alternate visual and tactile strategies (mixed foragers), and one tactile forager. We quantified the number of birds and their foraging behaviour at sites affected and not affected by streetlights, and also before and after illuminating experimental sites. Areas illuminated by streetlights were used more during the night by visual foragers, and to a lesser extent by mixed foragers, than non-illuminated areas. Visual foragers increased their foraging effort in illuminated areas, and mixed foragers changed to more efficient visual foraging strategies. These behavioural shifts improved prey intake rate by an average of 83% in visual and mixed foragers. We have showed that artificial illumination has a positive effect on the nocturnal foraging of waders, but on the other hand may draw them to degraded areas close to urban centres, and potentially raises their exposure to predators. Our findings suggest that artificial illumination is worth investigation as a tool in the management of intertidal habitats for waders.

Keywords Foraging behaviour; Intertidal flats; Light pollution; Night foraging; Shorebirds; Tagus estuary

Authors D.S. Saunders, C.G.H. Steel, X. Vafopoulou, R.D. Lewis

Year 2002 Saunders DS, Steel CGH, Vafopoulou X, Lewis RD

Report Name Chapter 2 - Circadian Rhythms of Activity in Individual Insects

Publication Insect Clocks

Issue-page numbers 2002, Pages 7-42

URL <http://www.sciencedirect.com/science/article/pii/B9780444504074500033>

Abstract INSECTS, like other organisms, usually restrict their activity to certain times of the daily cycle. In natural conditions, or in the artificial light and temperature cycles provided in the laboratory, they may be—with respect to a particular activity—either night-active (nocturnal), day-active (diurnal) or twilight-active (crepuscular). The mechanisms controlling these activity rhythms may be exogenous (i.e. a direct response to environmental changes) or endogenous (i.e. controlled by an underlying circadian oscillation, or oscillations, which are a part of the physiological make-up of the organism). Most activity rhythms have proved to be a 'mixture' of endogenous and exogenous components. Overt rhythm of activity, although controlled by an endogenous oscillation, are continuously modulated by the direct effects of the environmental cycles of light and temperature, particularly the abrupt changes in light intensity at dawn and dusk. Here we are mainly interested in the endogenous aspects of rhythmic phenomena because the intrinsic and self-sustained physiological oscillations controlling them function as 'biological clocks', and provide temporal organisation for a wide array of behavioural activities.

Keywords

Authors Andreas Savvides, Dimitrios Fanourakis and Wim van Ieperen

Year 2011 Savvides A, Fanourakis D, van Ieperen W

Report Name Co-ordination of hydraulic and stomatal conductances across light qualities in cucumber leaves

Publication J. Exp. Bot.

Issue-page numbers doi: 10.1093/jxb/err348 First published online: November 25, 2011

URL <http://jxb.oxfordjournals.org/content/early/2011/11/25/jxb.err348.abstract>

Abstract Long-term effects of light quality on leaf hydraulic conductance (Kleaf) and stomatal conductance (gs) were studied in cucumber, and their joint impact on leaf photosynthesis in response to osmotic-induced water stress was assessed. Plants were grown under low intensity monochromatic red (R, 640 nm), blue (B, 420 nm) or combined red and blue (R:B, 70:30) light. Kleaf and gs were much lower in leaves that developed without blue light. Differences in gs were caused by differences in stomatal aperture and stomatal density, of which the latter was largely due to differences in epidermal cell size and hardly due to stomatal development. Net photosynthesis (AN) was lowest in R-, intermediate in B-, and highest in RB- grown leaves. The low AN in R-grown leaves correlated with a low leaf internal CO₂ concentration and reduced PSII operating efficiency. In response to osmotic stress, all leaves showed similar degrees of stomatal closure, but the reduction in AN was larger in R- than in B- and RB-grown leaves. This was probably due to damage of the photosynthetic apparatus, which only occurred in R-grown leaves. The present study shows the co-ordination of Kleaf and gs across different light qualities, while the presence of blue in the light spectrum seems to drive both Kleaf and gs towards high, sun-type leaf values, as was previously reported for maximal photosynthetic capacity and leaf morphology. The present results suggest the involvement of blue light receptors in the usually harmonized development of leaf characteristics related to water relations and photosynthesis under different light environments.

Keywords Amphistomatous, Cucumis sativus, leaf development, leaf hydraulic conductance, light quality, osmotic stress, photosynthesis

Authors Schafmeier T, Diernfellner AC.

Year 2011 Schafmeier T, Diernfellner AC

Report Name Light input and processing in the circadian clock of Neurospora.

Publication FEBS Lett

Issue-page numbers 2011 May 20;585(10):1467-73. Epub 2011 Mar 29.

URL <http://www.ncbi.nlm.nih.gov/pubmed/21453703>

Abstract Circadian clocks are endogenous oscillators that use zeitgebers as environmental cues to synchronise with the exogenous day-night cycle. The role of light as a zeitgeber has been investigated intensively to date. In *Neurospora crassa* the transcription factor White Collar Complex (WCC) is directly activated by light, which resets the clock. In addition, a hierarchical cascade of transcription factors activates the light-induced expression of hundreds of genes. Disturbance of the clock during the day through changes in light intensity should be prevented to ensure efficient synchronisation. This can be achieved by desensitisation to the ambient light (photoadaptation). Photoadaptation in *Neurospora* is dependent on the blue light receptor Vivid (VVD), which accumulates immediately after light activation and rapidly silences the expression of WCC-dependent genes. Recent studies have elucidated the molecular mechanism of VVD-mediated photoadaptation. Here we review the increasing knowledge about light-dependent gene expression and photoadaptation in *Neurospora* and discuss their relevance for synchronisation of the circadian clock.

Keywords

Authors Miriam Schutter, Rosa M. van der Ven, Max Janse, Johan A.J. Verreth, René H. Wijffels and Ronald Osinga

Year 2011 Schutter M, van der Ven RM, Janse M, et al.

Report Name Light intensity, photoperiod duration, daily light flux and coral growth of *Galaxea fascicularis* in an aquarium setting: a matter of photons?

Publication Journal of the Marine Biological Association of the United Kingdom

Issue-page numbers Article : pp 1-10 DOI: 10.1017/S0025315411000920

URL <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8333916>

Abstract Light is one of the most important abiotic factors influencing the (skeletal) growth of scleractinian corals. Light stimulates coral growth by the process of light-enhanced calcification, which is mediated by zooxanthellar photosynthesis. However, the quantity of light that is available for daily coral growth is not only determined by light intensity (i.e. irradiance), but also by photoperiod (i.e. the light duration time). Understanding and optimizing conditions for coral growth is essential for sustainable coral aquaculture. Therefore, in this study, the question was explored whether more light (i.e. more photons), presented either as irradiance or as light duration, would result in more growth. A series of nine genetically identical coral colonies of *Galaxea fascicularis* L. were cultured for a period of 18 weeks at different light duration times (8 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:16 hours dark, 12 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:12 hours dark, 16 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:8 hours dark, 24 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:0 hours dark) and different irradiance levels (8 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:16 hours dark, 8 hours 225 $\mu\text{E m}^{-2} \text{s}^{-1}$:16 hours dark and 8 hours 300 $\mu\text{E m}^{-2} \text{s}^{-1}$:16 hours dark). Growth was determined every two weeks by measuring buoyant weight. Temperature, salinity and feeding levels were kept constant during the experiment. To detect possible acclimation of the corals to an increased light duration, rates of net photosynthesis and dark respiration were measured, hereby comparing coral colonies grown under an 8:16 hours light (150 $\mu\text{E m}^{-2} \text{s}^{-1}$):dark cycle with corals grown under a 16:8 hours light (150 $\mu\text{E m}^{-2} \text{s}^{-1}$):dark cycle. No increase in growth was detected with either increasing photoperiod or irradiance. Continuous lighting (24 hours 150 $\mu\text{E m}^{-2} \text{s}^{-1}$:0 hours dark) resulted in immediate bleaching and the corals died after 14 weeks. Hourly photosynthetic rates were significantly reduced in the 16 hour light treatment compared to the 8 hour light treatment. As a result, daily net photosynthetic rates were not significantly different, which may explain the observed specific growth rates. Acclimation to photoperiod duration appeared neither to be mediated by changes in chlorophyll-a concentration nor zooxanthellae density. Based on the results of this study, we can conclude that the enhancing effect of light on coral growth is not only a matter of photons. Obviously, the availability of light was not limiting growth in these experiments and was probably in excess (i.e. stressful amounts). Other factors are discussed that play a role in determining growth rates and might explain our results.

Keywords

Authors Schwartz, A. and R.W. Henderson

Year 1991 Schwartz A, Henderson RW

Report Name Amphibians and reptiles of the West Indies: descriptions, distributions, and Natural history

Publication Book

Issue-page numbers University of Florida Press, Gainesville

URL <http://www.amazon.com/Amphibians-Reptiles-West-Indies-Distributions/dp/product-description/0813010497>

Abstract Book

Keywords

Authors Romina Sellaro, Manuel Pacín and Jorge J. Casal

Year 2012 Sellaro R, Pacín M, Casal JJ

Report Name Diurnal Dependence of Growth Responses to Shade in Arabidopsis: Role of Hormone, Clock, and Light Signaling

Publication Mol. Plant

Issue-page numbers doi: 10.1093/mp/ssr122

URL <http://mplant.oxfordjournals.org/content/early/2012/02/05/mp.ssr122.abstract>

Abstract We investigated the diurnal dependence of the hypocotyl-growth responses to shade under sunlight–night cycles in *Arabidopsis thaliana*. Afternoon shade events promoted hypocotyl growth, while morning shade was ineffective. The *lhy-D*, *elf3*, *lux*, *pif4 pif5*, *toc1*, and quadruple *della* mutants retained the response to afternoon shade and the lack of response to morning shade while the *lhy cca1* mutant responded to both morning and afternoon shade. The *phyB* mutant, plants overexpressing the multidrug resistance-like membrane protein ABCB19, and the *iaa17/axr3* loss-of-function mutant failed to respond to shade. Transient exposure of sunlight-grown seedlings to synthetic auxin in the afternoon caused a stronger promotion of hypocotyl growth than morning treatments. The promotion of hypocotyl growth by afternoon shade or afternoon auxin required light perceived by phytochrome A or cryptochromes during the previous hours of the photoperiod. Although the ELF4–ELF3–LUX complex, PIF4, PIF5, and DELLA are key players in the generation of diurnal hypocotyl-growth patterns, they exert a minor role in the control of the diurnal pattern of growth responses to shade. We conclude that the strong diurnal dependency of hypocotyl-growth responses to shade relates to the balance between the antagonistic actions of LHY–CCA1 and a light-derived signal.

Keywords

Authors Yong-Yi Shen, Jie Liu, David M. Irwin, and Ya-Ping Zhang

Year 2010 Shen Y, Liu J, Irwin DM, Zhang Y

Report Name Parallel and Convergent Evolution of the Dim-Light Vision Gene RH1 in Bats (Order: Chiroptera)

Publication PLoS One

Issue-page numbers 5(1): e8838.

URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2809114/>

Abstract Rhodopsin, encoded by the gene Rhodopsin (RH1), is extremely sensitive to light, and is responsible for dim-light vision. Bats are nocturnal mammals that inhabit poor light environments. Megabats (Old-World fruit bats) generally have well-developed eyes, while microbats (insectivorous bats) have developed echolocation and in general their eyes were degraded, however, dramatic differences in the eyes, and their reliance on vision, exist in this group. In this study, we examined the rod opsin gene (RH1), and compared its evolution to that of two cone opsin genes (SWS1 and M/LWS). While phylogenetic reconstruction with the cone opsin genes SWS1 and M/LWS generated a species tree in accord with expectations, the RH1 gene tree united Pteropodidae (Old-World fruit bats) and Yangochiroptera, with very high bootstrap values, suggesting the possibility of convergent evolution. The hypothesis of convergent evolution was further supported when nonsynonymous sites or amino acid sequences were used to construct phylogenies. Reconstructed RH1 sequences at internal nodes of the bat species phylogeny showed that: (1) Old-World fruit bats share an amino acid change (S270G) with the tomb bat; (2) *Miniopterus* share two amino acid changes (V104I, M183L) with Rhinolophoidea; (3) the amino acid replacement I123V occurred independently on four branches, and the replacements L99M, L266V and I286V occurred each on two branches. The multiple parallel amino acid replacements that occurred in the evolution of bat RH1 suggest the possibility of multiple convergences of their ecological specialization (i.e., various photic environments) during adaptation for the nocturnal lifestyle, and suggest that further attention is needed on the study of the ecology and behavior of bats.

Keywords

Authors Hyun Suk Shin, Jehee Lee, Cheol Young Choi

Year 2011 Shin HS, Lee J, Choi CY

Report Name Effects of LED light spectra on oxidative stress and the protective role of melatonin in relation to the daily rhythm of the yellowtail clownfish, *Amphiprion clarkii*

Publication Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology

Issue-page numbers Volume 160, Issue 2, October 2011, Pages 221-228

URL <http://www.sciencedirect.com/science/article/pii/S109564331100170X>

Abstract The present study aimed to test the effects of melatonin on oxidative stress in the yellowtail clownfish, *Amphiprion clarkii*, as produced by light emitting diodes (LEDs): red, green, and blue. We investigated the effects of the different LEDs on oxidative stress by measuring the mRNA expression of arylalkylamine N-acetyltransferase (AANAT2), the expression and activities of antioxidant enzymes (superoxide dismutase, SOD (EC 1.15.1.1); and catalase, CAT (EC 1.11.1.6)), and plasma H₂O₂ and plasma melatonin levels. In red light, the expression of AANAT2, SOD, and CAT mRNA was significantly higher than those under the other light spectra. SOD and CAT activities and plasma H₂O₂ and melatonin levels were also significantly higher for the red spectra than those for the other light spectra. These results indicate that red light induces oxidative stress. To investigate the effects of melatonin on oxidative stress, we injected melatonin into live fish (in vivo) or treated cultured pineal organ (in vitro) with melatonin. We found that AANAT2, SOD, and CAT mRNA expression levels, SOD and CAT activities, and plasma H₂O₂, lipid peroxidation (LPO) and melatonin levels were significantly lower than those for the controls. Therefore, our results indicate that red light induces oxidative stress and melatonin plays the role of a strong antioxidant in yellowtail clownfish.

Keywords Light emitting diodes; Light spectrums; Melatonin; Oxidative stress; Yellowtail clownfish

Authors Sivinski, J. M.

Year 1998 Sivinski JM

Report Name Phototropism, bioluminescence, and the Diptera

Publication Florida Entomologist

Issue-page numbers 81(3):282-292

URL <http://www.jstor.org/pss/3495919>

Abstract Many arthropods move toward or away from lights. Larvae of certain luminescent mycetophilid fungus gnats exploit this response to obtain prey. They produce mucus webs, sometimes festooned with poisonous droplets, to snare a variety of small arthropods. Their lights may also protect them from their own negatively phototropic predators and/or be used as aposematic signals. On the other hand, lights may aid hymenopterous parasitoids to locate fungus gnat hosts. The luminescence of mushrooms can attract small Diptera, and might have evolved to aid mechanical spore dispersal. Among Diptera, bioluminescence is found only in the Mycetophilidae, but the variety of light organs in fungus gnats suggests multiple evolutions of the trait. This concentration of bioluminescence may be due to the unusual, sedentary nature of prey capture (i.e., use of webs) that allows the 'mimicry' of a stationary abiotic light cue, or the atypically potent defenses webs and associated chemicals might provide (i.e., an aposematic display of unpalatability).

Keywords

Authors Brooke M. Steenhard^{1,2} and Joseph C. Besharse¹

Year 2000 Steenhard BM, Besharse JC

Report Name Phase shifting the retinal circadian clock: xPer2 mRNA induction by light and dopamine

Publication The Journal of Neuroscience

Issue-page numbers December 1, 2000, 20(23):8572–8577

URL <http://www.jneurosci.org/content/20/23/8572.full.pdf>

Abstract □A circadian clock is located in the retinal photoreceptors of the □dopamine is the same at all times of day tested. In contrast, □ African clawed frog *Xenopus laevis*. These photoreceptor clocks □xPer1 mRNA exhibits circadian oscillations but is relatively in-□ are thought to govern a wide variety of output rhythms, including □sensitive to phase-shifting treatments of light or dopamine. Our □ melatonin release and gene expression. Both light and dopamine □data suggest that xPer2 functions as the molecular link between □ phase shift the retinal clock in a phase-dependent manner. Two □the light/dark cycle and the circadian clock. □ homologs of the *Drosophila* period gene have been cloned in □□ *Xenopus*, and one of these (xPer2) is acutely regulated by light. □Key words: circadian rhythms; circadian clock; period genes; □ Light and dopamine induce xPer2 mRNA in a similar manner. In □phase shifting; light induction; retina; photoreceptors; dopamine; □ addition, the increase of xPer2 mRNA in response to light and □D2 receptors; *Xenopus*

Keywords circadian rhythms; circadian clock; period genes;

Authors Emma L. Stone, Gareth Jones, Stephen Harris

Year 2012 Stone EL, Jones G, Harris S

Report Name Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats

Publication Global Change Biology

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2012.02705.x/abstract>

Abstract Artificial lighting is a key biodiversity threat and produces 1900 million tonnes of CO₂ emissions globally, more than three times that produced by aviation. The need to meet climate change targets has led to a global increase in energy-efficient light sources such as high-brightness light-emitting diodes (LEDs). Despite the energetic benefits of LEDs, their ecological impacts have not been tested. Using an experimental approach, we show that LED street lights caused a reduction in activity of slow-flying bats (*Rhinolophus hipposideros* and *Myotis* spp.). Both *R. hipposideros* and *Myotis* spp. activities were significantly reduced even during low light levels of 3.6 lux. There was no effect of LED lighting on the relatively fast-flying *Pipistrellus pipistrellus*, *Pipistrellus pygmaeus* and *Nyctalus/Eptesicus* spp. We provide the first evidence of the effects of LED lights on bats. Despite having considerable energy-saving benefits, LED lights can potentially fragment commuting routes for bats with associated negative conservation consequences. Our results add to the growing evidence of negative impacts of lighting on a wide range of taxa. We highlight the complexities involved in simultaneously meeting targets for reduction of greenhouse gas emissions and biodiversity loss. New lighting strategies should integrate climate change targets with the cultural, social and ecological impacts of emerging lighting technologies.

Keywords anthropogenic impacts; biodiversity conservation; climate change targets; LED street lights; light pollution; light-emitting diodes

Authors Emma Louise Stone, Gareth Jones, Stephen Harris

Year 2009 Stone EL, Jones G, Harris S

Report Name Street Lighting Disturbs Commuting Bats

Publication Current Biology

Issue-page numbers Volume 19, Issue 13, 14 July 2009, Pages 1123-1127

URL <http://www.sciencedirect.com/science/article/pii/S0960982209011932>

Abstract Anthropogenic disturbance is a major cause of worldwide declines in biodiversity [1]. Understanding the implications of this disturbance for species and populations is crucial for conservation biologists wishing to mitigate negative effects. Anthropogenic light pollution is an increasing global problem [2], affecting ecological interactions across a range of taxa and impacting negatively upon critical animal behaviors including foraging, reproduction, and communication (for review see [2] and [3]). Almost all bats are nocturnal [4], making them ideal subjects for testing the effects of light pollution. Previous studies have shown that bat species adapted to foraging in open environments feed on insects attracted to mercury vapor lamps. Here, we use an experimental approach to provide the first evidence of a negative effect of artificial light pollution on the commuting behavior of a threatened bat species. We installed high-pressure sodium lights that mimic the intensity and light spectra of streetlights along commuting routes of lesser horseshoe bats (*Rhinolophus hipposideros*). Bat activity was reduced dramatically and the onset of commuting behavior was delayed in the presence of lighting, with no evidence of habituation. These results demonstrate that light pollution may have significant negative impacts upon the selection of flight routes by bats.

Keywords

Authors G W Stutte, N C Yorio, R M Wheeler

Year 1996 Stutte GW, Yorio NC, Wheeler RM

Report Name Interacting effects of photoperiod and photosynthetic photon flux on Net carbon Assimilation and Starch Accumulation in Potato Leaves

Publication J. of the American Society for Horticultural Science. American Society for Horticultural Science

Issue-page numbers 121(2):264-8.

URL http://www.researchgate.net/publication/11807780_Interacting_effects_of_photoperiod_and_photosynthetic_photon_flux_on_net_carbon_assimilation_and_starch_accumulation

Abstract The effect of photoperiod (PP) on net carbon assimilation rate (Anet) and starch accumulation in newly mature canopy leaves of 'Norland' potato (*Solanum tuberosum* L.) was determined under high (412 varies as mol m⁻²s⁻¹) and low (263 varies as mol m⁻²s⁻¹) photosynthetic photon flux (PPF) conditions. The Anet decreased from 13.9 to 11.6 and 9.3 micromoles m⁻²s⁻¹, and leaf starch increased from 70 to 129 and 118 mg g⁻¹ drymass (DM) as photoperiod (PP) was increased from 12/12 to 18/6, and 24/0, respectively. Longer PP had a greater effect with high PPF conditions than with low PPF treatments, with high PPF showing greater decline in Anet. Photoperiod did not affect either the CO₂ compensation point (50 micromoles mol⁻¹) or CO₂ saturation point (1100-1200 micromoles mol⁻¹) for Anet. These results show an apparent limit to the amount of starch that can be stored (approximately 15% DM) in potato leaves. An apparent feedback mechanism exists for regulating Anet under high PPF, high CO₂, and long PP, but there was no correlation between Anet and starch concentration in individual leaves. This suggests that maximum Anet cannot be sustained with elevated CO₂ conditions under long PP (> or = 12 hours) and high PPF conditions. If a physiological limit exists for the fixation and transport of carbon, then increasing photoperiod and light intensity under high CO₂ conditions is not the most appropriate means to maximize the yield of potatoes.

Keywords

Authors SUMMERS C. G.

Year 1997 Summers CG

Report Name Phototactic behavior of Bemisia argentifolii (Homoptera: Aleyrodidae) crawlers

Publication Annals of the Entomological Society of America

Issue-page numbers vol. 90, no3, pp. 372-379 (30 ref.)

URL <http://cat.inist.fr/?aModele=afficheN&cpsid=2739515>

Abstract First instars (crawlers) of Bemisia argentifolii Bellows & Perring were observed in the field and laboratory to move upward on plants, presumably in search of acceptable feeding sites. Laboratory experiments were conducted on a host plant and an artificial surface to determine if this movement was random, or a response to light (phototaxis) or gravity (geotaxis). Greenhouse-reared B. argentifolii crawlers were positively phototactic in experiments conducted on a host plant and on an artificial surface of black construction paper. Crawlers moved up or down the petiole of cheeseweed, Malva parviflora L., with equal facility, toward a light source placed either above or below the leaf blade. Response was always toward the light (positive phototaxis) and there was no response to gravity, either positive or negative. Crawlers placed on an artificial surface in a dark arena and presented with a point light source had a significant mean angular dispersion toward the light. Crawlers illuminated with uniform overhead lighting or kept in darkness moved about the arena at random. Crawlers maintained in darkness on cheeseweed and the artificial surface moved a significantly shorter distance from their origin than did those exposed to light. Such behavior suggests that some minimal light intensity may be necessary to stimulate crawler activity. The positive phototactic response may contribute to survival of B. argentifolii by enabling individuals eclosing from fall laid eggs, on leaves that become senescent during the winter, to find suitable leaves for development higher on the plant.

Keywords

Authors Wei Sun, Nerea Ubierna, Jian-Ying Ma, Asaph B. Cousin

Year 0 Sun W, Ubierna N, Ma J, Cousin AB

Report Name The influence of light quality on C4 photosynthesis under steady-state conditions in Zea mays and Miscanthus × giganteus: changes in rates of photosynthesis but not the efficiency

Publication Plant, Cell & Environment

Issue-page numbers "Accepted Article"; doi: 10.1111/j.1365-3040.2011.02466.x

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-3040.2011.02466.x/abstract>

Abstract Differences in light quality penetration within a leaf and absorption by the photosystems alter rates of CO₂ assimilation in C₃ plants. It is also expected that light quality will have a profound impact on C₄ photosynthesis due to disrupted coordination of the C₄ and C₃ cycles. To test this hypothesis, we measured leaf gas exchange, ¹³C₂ discrimination (Δ¹³C), photosynthetic metabolite pools and Rubisco activation state in Zea mays and Miscanthus × giganteus under steady-state red, green, blue and white light. Photosynthetic rates, quantum yield of CO₂ assimilation, and maximum phosphoenolpyruvate carboxylase activity were significantly lower under blue light than white, red and green light in both species. However, similar leakiness under all light treatments suggests the C₄ and C₃ cycle was coordinated to maintain the photosynthetic efficiency. Measurements of photosynthetic metabolite pools also suggest coordination of C₄ and C₃ cycle across light treatments. The energy limitation under blue light affected both C₄ and C₃ cycles, as we observed a reduction in C₄ pumping of CO₂ into bundle-sheath cells and a limitation in the conversion of C₃ metabolite phosphoglycerate to triose phosphate. Overall, light quality affects rate of CO₂ assimilation rates, but not the efficiency of CO₂ concentrating mechanism.

Keywords

Authors Sustare, B. D.
Year 1977 Sustare BD
Report Name Characterizing parameters of response to light intensity for six species of frogs
Publication Behavioural Processes
Issue-page numbers Vol 2(2), Jun 1977, 101-112. doi: 10.1016/0376-6357(77)90014-6
URL <http://psycnet.apa.org/psycinfo/1978-26759-001>

Abstract Conducted a comparative study to examine differences in intensity response by 6 anuran species: *Hyla cinera*, *Hyla gratiosa*, *Rana catesbeiana*, *Rana sylvatica*, *Kassina senegalensis*, and *Leptodactylus pentadactylus*. Using the sigmoid intensity/response curve to represent a cumulative Gaussian distribution gave a very good fit to the data for both dark- and light-adapted animals. Characterizing parameters from the regression to transformed data gave good distinctions between the species for both adaptational states.

Keywords

Authors Sustek, Z
Year 1999 Sustek Z
Report Name Light attraction of carabid beetles and their survival in the city centre
Publication Biologia (Bratislava)
Issue-page numbers 54(5):539-551
URL N/A

Abstract A carabid assemblage attracted on an intensively illuminated advertisement table above a shop window in the centre of Bratislava in August and September 1997 consisted of 40 species. This number was almost the same as in the pitfall trap catches carried out during three growing seasons in 13 sites in Bratislava. Almost 94% of individuals belonged to autumn breeding species inhabiting arable land, while the spring breeders were little represented. Compared with light traps catches performed in other localities by other authors, there was an increased proportion of *Amara apricaria*. In addition the xerothermophilous species *Harpalus tenebrosus* and *H. zabroides* and the rare *Polystichus connexus* were found. Three major periods in flight activity and species composition of the Carabid assemblage were distinguished according to species abundance and presence. A large number of *Pseudoophonus rufipes*, *P. calceatus*, *Dolichus halensis* and *Chlaenius spoliatus* colonised the study site. They used various small caves in the walls, gutter pipe outlets or ants' galleries in the sand between pavement and wall bases as an effective cover. The beetles exhibited a surprising ability to survive in the city centre asphalt desert.

Keywords

Authors A.M SVENSSON, J RYDELL

Year 1998 Svensson AM, Rydell J

Report Name Mercury vapour lamps interfere with the bat defence of tympanate moths (Operophtera spp.; Geometridae)

Publication Animal Behaviour

Issue-page numbers Volume 55, Issue 1, January 1998, Pages 223-226

URL <http://www.sciencedirect.com/science/article/pii/S000334729790590X>

Abstract Bats often forage near streetlamps, where they catch moths in particular. At least two hypotheses may explain the apparent increase in the availability of moths to bats feeding around streetlamps: (1) the moths become concentrated near the light and therefore more profitable to exploit; and (2) the light interferes with the moths' evasive flight behaviour. We tested the second of these hypotheses by exposing flying male winter moths, *Operophtera* spp., to bursts of ultrasound (26 kHz, 110 dB sound pressure level) from an electronic source. The light from a 125 W mercury vapour lamp had a quantitative effect on the moths' evasive flight response at close range (within ca 4 m), inhibiting it totally in nearly half (43%, N=125) of the cases. By contrast, moths flying in the surrounding woodland and without interference from the lamp always responded to the sound. Streetlamps of the mercury vapour type (white lamps) thus interfere with the defensive behaviour of moths and presumably increase their vulnerability to echolocating bats. This may have implications for the conservation of both moths and bats.

Keywords

Authors G. N. Swinney, M. R. Clarke and L. Maddock

Year 1986 Swinney GN, Clarke MR, Maddock L

Report Name Influence of an electric light on the capture of deep-sea fish in Biscay

Publication Journal of the Marine Biological Association of the United Kingdom

Issue-page numbers Volume 66, Issue 02, 66: 483-496

URL <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=4377996>

Abstract Recently the influence of an electric light on the capture of the main groups of deep sea animals by a midwater trawl was described and discussed (Clarke & Pascoe, 1985). With regard to fish it was shown that at depths close to 800 m the total number, the total volume, the volume of the ten largest and the volume of the single largest fish all increased significantly when an electric light was used on the headline of the trawl when compared with controls with the light off. These experiments were carried out both in the Bay of Biscay and off Madeira.

Keywords

<i>Authors</i>	Ferenc Szentkirályi, Balázs Bernáth, Ferenc Kádár, & Imre Retezár
<i>Year</i>	2005 Szentkirályi F, Bernáth B, Kádár F, Retezár I
<i>Report Name</i>	Flight of ground beetles towards polarized and unpolarized light sources
<i>Publication</i>	DIAS Report
<i>Issue-page numbers</i>	No. 114 (2005), 313-324
<i>URL</i>	http://www.julia-nki.hu/bbernath/ECP2003Proc.pdf
<i>Abstract</i>	<p>The visual system of many insect species is sensitive to polarized light. This ability allows them to use the polarization pattern of skylight, or light reflected by water surfaces for navigation or habitat detection. Many aquatic insects detect their habitats by perceiving watersurface-reflected, horizontally polarized light. Using light trap pairs emitting horizontally polarized or unpolarized light, and operating between April and October, 2001-2002 in central Hungary, we sought for potentially polarotactic flying insect species. Two trap pairs were set up in a wet (near riparian forest on a riverbank) and a dry (ridge of sand dune) habitat. The structural characteristics of carabid assemblages attracted by the two light sources of trap pairs did not differ significantly. The species living in waterside habitats were represented by higher cumulative relative abundance in polarized light traps. From the recorded 115 carabid species, the hygrophilous <i>Bembidion minimum</i> and <i>B. varium</i> were attracted in significantly greater numbers to polarized than to unpolarized light at both sites. This is the first report about probable polarotaxis of carabid species. Other six ground beetle species seem to be candidates for polarization sensitivity, but this awaits further confirmation.</p>
<i>Keywords</i>	Carabidae, light-trapping, polarotaxis, <i>Bembidion</i> spp

Authors Takemura A, Ueda S, Hiyakawa N, Nikaido Y.

Year 2006 Takemura A, Ueda S, Hiyakawa N, Nikaido Y

Report Name A direct influence of moonlight intensity on changes in melatonin production by cultured pineal glands of the golden rabbitfish, *Siganus guttatus*

Publication J Pineal Res

Issue-page numbers Apr;40(3):236-41.

URL <http://www.ncbi.nlm.nih.gov/pubmed/16499560>

Abstract Rabbitfish are a restricted lunar-synchronized spawner that spawns around a species-specific lunar phase. It is not known how the fish perceive changes in cues from the moon. One possible explanation is that rabbitfish utilize changes in moonlight intensity to establish synchrony. The purpose of the present study was to examine whether or not the pineal gland of the golden rabbitfish can directly perceive changes in moonlight intensity. Isolated pineal glands were statically cultured under natural or artificial light conditions and melatonin secreted into the culture medium was measured using a time-resolved fluoroimmunoassay. Under an artificial light/dark cycle, melatonin secretion significantly increased during the dark phase. Under continuous light conditions, melatonin secretion was suppressed, while culture under continuous dark conditions seemed to duplicate melatonin secretion corresponding to the light/dark cycle in which the fish were acclimated. When cultured pineal glands were kept under natural light conditions on the dates of the full and the new moon, small amounts of melatonin were secreted at night. Moreover, exposure of cultured pineal glands to artificial and natural light conditions resulted in a significant decrease of melatonin secretion within 2 hr. These results suggest that the isolated pineal gland of golden rabbitfish responds to environmental light cycles and that 'brightness' of the night moon has an influence on melatonin secretion from the isolated pineal gland.

Keywords

Authors Miho Takemura, Yukio Okimura, Haruka Kida, Tatsuro Hamada and Kanji Ohyama

Year 2011 Takemura M, Okimura Y, Kida H, et al.

Report Name Blue light enhances the accumulation of eicosapentaenoic acid in a liverwort, *Marchantia polymorpha* L.

Publication Plant Biotechnology

Issue-page numbers ONLINE □ISSN □: □1347-6114

URL http://www.jstage.jst.go.jp/article/plantbiotechnology/advpub/0/advpub_1111250055/_article

Abstract Liverwort, *Marchantia polymorpha* L. synthesizes various polyunsaturated fatty acids such as arachidonic acid (AA) and eicosapentaenoic acid (EPA), neither of which is produced by higher plants. Here, we report the effects of light quality and intensity on the accumulation of AA and EPA in liverwort. In the range of the light examined, the relative content of EPA to total fatty acid was highest under blue light although that of AA did not vary. Illumination with blue light for a short period efficiently improved the accumulation of EPA without great deficit of growth. At a higher intensity of white light, the relative content of EPA increased. The optimum light intensity for AA and EPA accumulation was found to be 80 photon flux density $\mu\text{mol m}^{-2} \text{s}^{-1}$.

Keywords Arachidonic acid, blue light, eicosapentaenoic acid, liverwort, polyunsaturated fatty acid

Authors Tárano, Z

Year 1998 Tárano Z

Report Name Cover and ambient light influence nesting preferences of the Túngara frog *Physalaemus pustulosus*

Publication Copeia

Issue-page numbers 1998:250-251

URL N/A

Abstract N/A

Keywords

Authors Harriette Taylor & Jacquie Cozens

Year 0 Taylor H, Cozens J

Report Name The effects of tourism, beachfront development and increased light pollution on nesting Loggerhead turtles *Caretta caretta* (Linnaeus, 1758) on Sal, Cape Verde Islands

Publication Zoologia Caboverdiana

Issue-page numbers 1 (2): 100-111 ISSN 2074-5737

URL <http://files.embedit.in/embeditin/files/CL3o6z9UxV/1/file.pdf>

Abstract Loggerhead *Caretta caretta* is now the only species of marine turtle nesting on the island of Sal, Cape Verde Islands. Since 2008, ADTMA - SOS Tartarugas has patrolled all the southern beaches of the island in order to protect nesting females and to collect nesting data. Although hunting is still a major issue, with 90 turtles killed in 2009, habitat loss and light pollution are becoming an ever more serious threat. Construction sites, hotels, apartment buildings and restaurants close to beaches, bright lights and illegal removal of sand are contributing to a marked decrease in the total number of nesting turtles on some beaches. In 2009, beaches on Sal experienced an average increase in nests of 200%, while the beach most affected by construction (Tortuga Beach) saw a decrease of nests of 7.3% (from 19.1% of total number of nests in 2008 to 11.8% in 2010). This beach also recorded a much lower nest to emergence ratio than normal (17.6% of emergences resulting in nests compared to 29.9% in other areas), indicating reluctance to nest due to light pollution and other disturbances.

Keywords Cheloniidae, Loggerhead, *Caretta caretta*, threats, conservation, Cape Verde Islands

Authors Thomas C. Telfer, John L. Sincock, G. Vernon Byrd and Jonathan R. Reed

Year 1987 Telfer TC, Sincock JL, Byrd GV, Reed JR

Report Name Attraction of Hawaiian seabirds to lights: conservation efforts and effects of moon phases

Publication Wildlife Society Bulletin

Issue-page numbers Vol. 15, No. 3 (Autumn, 1987), pp. 406-413

URL <http://www.jstor.org/pss/3782548>

Abstract Every autumn more than 1,000 fledglings of 3 threatened or endangered procellariiform seabird species are attracted to bright coastal lights on Hawaiian island of Kauai...

Keywords

Authors Terres, J.K.

Year 1956 Terres JK

Report Name Reducing airport hazards to migrating birds will help prevent death in the night

Publication Audubon Magazine

Issue-page numbers Jan/Feb, 18-22

URL N/A

Abstract N/A

Keywords

Authors Tessmer, J.W. Meek, C.L., Wright, V.L.

Year 1995 Tessmer JW, Meek CL, Wrigh VL

Report Name Circadian patterns of oviposition by necrophilous flies (Diptera: Calliphoridae) in southern Louisiana

Publication Southwestern entomologist

Issue-page numbers Dec 1995. v. 20 (4)

URL <http://openagricola.nal.usda.gov/Record/IND20533513>

Abstract Circadian ovipositional activities of calliphorid flies on poultry carcasses were assessed during two 24-h periods in mid-summer 1994 during full (July study) and new moon (August study) phases in urban habitats with artificial lighting and in rural habitats without artificial lighting. Immatures of *Cochliomyia macellaria* (F.) and *Phaenicia sericata* (Meigen) were the predominant species collected during each of the two 24-h field studies. Flies oviposited during the afternoon diurnal hours and during the morning diurnal period of the following day of the July and August studies. However, egg deposition did not occur on any poultry carcass between the nocturnal hours of 2100 and 0500-h CDST for either study period regardless of the presence or absence of artificial or natural (i.e., full moon) lighting.

Keywords

Authors Mieke Titulaer, Kamiel Spoelstra, Cynthia Y. M. J. G. Lange, Marcel E. Visser

Year 2012 Titulaer M, Spoelstra K, Lange CYMJG, Visser ME

Report Name Activity Patterns during Food Provisioning Are Affected by Artificial Light in Free Living Great Tits (*Parus major*)

Publication PLoS ONE

Issue-page numbers 7(5): e37377. doi:10.1371/journal.pone.0037377

URL <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0037377>

Abstract Artificial light may have severe ecological consequences but there is limited experimental work to assess these consequences. We carried out an experimental study on a wild population of great tits (*Parus major*) to assess the impact of light pollution on daily activity patterns during the chick provisioning period. Pairs that were provided with a small light outside their nest box did not alter the onset, cessation or duration of their working day. There was however a clear effect of artificial light on the feeding rate in the second half of the nestling period: when provided with artificial light females increased their feeding rate when the nestlings were between 9 and 16 days old. Artificial light is hypothesised to have affected the perceived photoperiod of either the parents or the offspring which in turn led to increased parental care. This may have negative fitness consequences for the parents, and light pollution may thus create an ecological trap for breeding birds.

Keywords

Authors Kenji Tomioka, Outa Uryu, Yuichi Kamae, Yujiro Umezaki and Taishi Yoshii

Year 2012 Tomioka K, Uryu O, Kamae Y, et al.

Report Name Peripheral circadian rhythms and their regulatory mechanism in insects and some other arthropods: a review

Publication Journal of Comparative Physiology B: Biochemical, Systemic, and Environmental Physiology

Issue-page numbers DOI: 10.1007/s00360-012-0651-1

URL <http://www.springerlink.com/content/7504808gqqg01175/>

Abstract Many physiological functions of insects show a rhythmic change to adapt to daily environmental cycles. These rhythms are controlled by a multi-clock system. A principal clock located in the brain usually organizes the overall behavioral rhythms, so that it is called the "central clock". However, the rhythms observed in a variety of peripheral tissues are often driven by clocks that reside in those tissues. Such autonomous rhythms can be found in sensory organs, digestive and reproductive systems. Using *Drosophila melanogaster* as a model organism, researchers have revealed that the peripheral clocks are self-sustained oscillators with a molecular machinery slightly different from that of the central clock. However, individual clocks normally run in harmony with each other to keep a coordinated temporal structure within an animal. How can this be achieved? What is the molecular mechanism underlying the oscillation? Also how are the peripheral clocks entrained by light–dark cycles? There are still many questions remaining in this research field. In the last several years, molecular techniques have become available in non-model insects so that the molecular oscillatory mechanisms are comparatively investigated among different insects, which give us more hints to understand the essential regulatory mechanism of the multi-oscillatory system across insects and other arthropods. Here we review current knowledge on arthropod's peripheral clocks and discuss their physiological roles and molecular mechanisms.

Keywords Circadian clock – Clock gene – Peripheral clock – Molecular oscillation – Entrainment

Authors Pierline Tournant, Eve Afonso, Sébastien Roué, Patrick Giraudoux, Jean-Christophe Foltete

Year 2011 Tournant P, Afonso E, Roué S, et al.

Report Name Assessing habitat connectivity of the lesser horseshoe bat using graph theory to explain its distribution

Publication VIth European Congress of Mammalogy

Issue-page numbers Paris : France (2011)

URL <http://hal.archives-ouvertes.fr/hal-00610755/>

Abstract The lesser horseshoe bat, *Rhinolophus hipposideros* was formerly widespread and quite common in north-western Europe, but has undergone a dramatic decline from the 1960s. The main hypothesis for this decline is a change of habitat quality. Recent works have stressed the importance of good connection between roosts and foraging areas by tree lines and well-structured hedgerows. Thus, landscape connectivity is assumed to be a key-factor for population sustainability. The present study is based on a case study in Franche-Comté (France). Its purpose is to model the distribution of the lesser horseshoe bat and to characterize the functional connectivity of its habitat. Graph theory is used efficiently in landscape ecology as a framework to model landscape connectivity (Galpern et al., 2011). In such approach, habitat patches defined as optimal for the focal species are considered as the nodes of a network. Connections between nodes are set up from ecological assumptions concerning the movements of the species within the landscape. The graph resulting from these connections allows quantifying the connectivity by means of different metrics. In the present case, patches were defined as composite objects requiring both places of potential roosts (i.e. small villages) and wooded environment. Among the different types of graph, we focused on the minimal planar graph, where all pairs of nearby patches are linked by the least-cost distance. This graph allowed computing several patch-based metrics including a parameter of dispersal distance. They were included in a species distribution model as explanatory factors in addition to other potential factors impacting movement and distribution as light pollution.

Keywords

Authors John L. Trapp

Year 2000 Trapp JL

Report Name BIRD KILLS AT TOWERS AND OTHER HUMAN-MADE STRUCTURES:

Publication U.S. Fish and Wildlife Service

Issue-page numbers Webpage

URL <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/tower.html>

Abstract The purpose of this document is to increase public awareness of the potential impacts of towers and other human-made structures by highlighting some of the pertinent literature on the subject. The bibliography focuses primarily on collisions with communication towers, lighted buildings, and (to a lesser degree) windows. No effort has been made to cover collisions with power lines or wind turbines, topics that have been addressed by Bevanger (1994) and Hebert et al. (1995).

Previous bibliographies on the subject of bird collisions with human-made objects have been prepared by Weir (1976), Avery et al. (1978), Avery et al. (1980), Hebert et al. (1995), and the National Wind Technology Center (n.d.). This document is intended to supplement, not duplicate, these earlier publications. Of the 125 citations listed below, 83 were published subsequent to Avery et al. (1980) and 102 were not included in Hebert et al. (1995); 24 of the citations are to Internet sites.

Keywords

Authors R N Trindell, M Conti, D Gallagher, B Witherington

Year 2008 Trindell RN, Conti M, Gallagher D, Witherington B

Report Name Sea turtles and lights on Florida's nesting beaches

Publication TwentyFifth Annual Symposium on Sea Turtle Biology and Conservation (2008)

Issue-page numbers Volume: NOAA Techn, Pages: 152-153

URL <http://www.mendeley.com/research/sea-turtles-lights-floridas-nesting-beaches/>

Abstract

Keywords

Authors	Troy, Jeff R., Nick D. Holmes, and M. Clay Green
Year	2011 Troy JR, Holmes ND, Green MC
Report Name	Modeling artificial light viewed by fledgling seabirds
Publication	Ecosphere
Issue-page numbers	2:art109. [doi:10.1890/ES11-00094.1]
URL	http://www.esajournals.org/doi/abs/10.1890/ES11-00094.1

Abstract Artificial light is increasing in coverage across the surface of our planet, impacting the behavioral ecology of many organisms. Attraction to sources of artificial light is a significant threat to certain fledgling shearwaters, petrels (Procellariidae), and storm-petrels (Hydrobatidae) on their first nocturnal flights to the sea. Disorientation by light can cause these birds to crash into vegetation or manmade structures, potentially resulting in death from physical injury, starvation, dehydration, predation by introduced predators, or collisions with vehicles. We developed a GIS-based method to model the intensity of artificial light that fledgling procellariids and hydrobatids could view en route to the ocean (to estimate the degree of threat that artificial light poses to these birds) and present two models for the island of Kauai as examples. These models are particularly relevant to the federally threatened Newell's Shearwater, or 'A'o (Puffinus newelli), of which >30,000 fledglings have been collected in response to disorientation by lights on Kauai during the past 30 years. Our models suggest that there are few to no portions of Kauai from which young birds could fledge and not view light on their post-natal nocturnal flights, which is concerning given evidence of a Newell's Shearwater population decline. In future work using this technique, night light intensity layers could be altered to model the effects of modified coastal light conditions on known and potential procellariid and hydrobatid breeding locations. Furthermore, certain methods presented herein may be applicable to other seabirds and additional taxa in which attraction to anthropogenic light poses a serious threat, including migratory passerines and hatchling marine turtles. Components of this modeling approach could potentially be used to spatially estimate effects of other point-source threats to ecological systems, including sound and air pollution.

Keywords

Authors	Tong-Seung Tseng and Winslow R. Briggs
Year	2010 Tseng T, Briggs WR
Report Name	The Arabidopsis rcn1-1 Mutation Impairs Dephosphorylation of Phot2, Resulting in Enhanced Blue Light Responses
Publication	The Plant Cell Online
Issue-page numbers	February 2010 vol. 22 no. 2 392-402
URL	http://www.plantcell.org/content/22/2/392.short

Abstract Phototropins (phot) sense blue light through the two N-terminal chromophore binding LOV domains and activate the C-terminal kinase domain. The resulting phototropin autophosphorylation is essential for biological activity. We identified the A1 subunit of Ser/Thr protein phosphatase 2A (PP2A) as interacting with full-length phot2 in yeast and also interacting with phot2 in an in vitro protein binding assay. Phenotypic characterizations of a phot1-5 rcn1-1 (for root curling in n-naphthylphthalamic acid1) double mutant, in which phot2 is the only functional phototropin and PP2A activity is reduced, showed enhanced phototropic sensitivity and enhanced blue light-induced stomatal opening, suggesting that PP2A activity is involved in regulating phot2 function. When treated with cantharidin, a chemical inhibitor of PP2A, the phot1-5 mutant exhibited enhanced phot2-mediated phototropic responses like those of the phot1-5 rcn1-1 double mutant. Immunoblot analysis to examine phot2 endogenous phosphorylation levels and in vitro phosphorylation assays of phot2 extracted from plants during dark recovery from blue light exposure confirmed that phot2 is more slowly dephosphorylated in the reduced PP2A activity background than in the wild-type PP2A background, suggesting that phosphorylated phot2 is a substrate of PP2A activity. While reduced PP2A activity enhanced the activity of phot2, it did not enhance either phot1 dephosphorylation or the activity of phot1 in mediating phototropism or stomatal opening.

Keywords

Authors Yu-Yao Tseng, Suzanne M. Hunt, Christian Heintzen, Susan K. Crosthwaite, Jean-Marc Schwartz

Year 2012 Tseng Y, Hunt SM, Heintzen C, et al.

Report Name Comprehensive Modelling of the Neurospora Circadian Clock and Its Temperature Compensation

Publication PLoS Comput Biol

Issue-page numbers 8(3): e1002437. doi:10.1371/journal.pcbi.1002437

URL <http://www.ploscompbiol.org/article/info%3Adoi%2F10.1371%2Fjournal.pcbi.1002437>

Abstract Circadian clocks provide an internal measure of external time allowing organisms to anticipate and exploit predictable daily changes in the environment. Rhythms driven by circadian clocks have a temperature compensated periodicity of approximately 24 hours that persists in constant conditions and can be reset by environmental time cues. Computational modelling has aided our understanding of the molecular mechanisms of circadian clocks, nevertheless it remains a major challenge to integrate the large number of clock components and their interactions into a single, comprehensive model that is able to account for the full breadth of clock phenotypes. Here we present a comprehensive dynamic model of the *Neurospora crassa* circadian clock that incorporates its key components and their transcriptional and post-transcriptional regulation. The model accounts for a wide range of clock characteristics including: a periodicity of 21.6 hours, persistent oscillation in constant conditions, arrhythmicity in constant light, resetting by brief light pulses, and entrainment to full photoperiods. Crucial components influencing the period and amplitude of oscillations were identified by control analysis. Furthermore, simulations enabled us to propose a mechanism for temperature compensation, which is achieved by simultaneously increasing the translation of *frq* RNA and decreasing the nuclear import of FRQ protein.

Keywords

Authors Susan M. Tuxbury, Michael Salmon

Year 2005 Tuxbury SM, Salmon M

Report Name Competitive interactions between artificial lighting and natural cues during seafinding by hatchling marine turtles

Publication Biological Conservation

Issue-page numbers Volume 121, Issue 2, January 2005, Pages 311-316

URL <http://www.sciencedirect.com/science/article/pii/S0006320704001958>

Abstract Artificial lighting disrupts the nocturnal orientation of sea turtle hatchlings as they crawl from their nest to the ocean. Laboratory experiments in an arena were used to simultaneously present artificial light (that attracted the turtles toward "land") and natural cues (a dark silhouette of the dune behind the beach) that promoted "seaward" orientation. Artificial lighting disrupted seaward crawling in the presence of low silhouettes, but not high silhouettes. Low silhouettes provided adequate cues for seaward crawling when the apparent brightness of artificial light was reduced. Based upon these results, we postulate that artificial light disrupts orientation by competing with natural cues. Current restoration practices at nesting beaches emphasize light reduction. However at many sites some lights cannot be modified. Our results suggest that pairing dune restoration (to enhance natural cues) with light reduction (to the extent possible) should significantly improve hatchling orientation, even at nesting beaches where lighting cannot be entirely eliminated.

Keywords Sea turtle; Orientation; Photopollution; Habitat restoration

Authors Susan M. Tuxbury, Michael Salmon

Year 2005 Tuxbury SM, Salmon M

Report Name Competitive interactions between artificial lighting and natural cues during seafinding by hatchling marine turtles

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Abstract Artificial lighting disrupts the nocturnal orientation of sea turtle hatchlings as they crawl from their nest to the ocean. Laboratory experiments in an arena were used to simultaneously present artificial light (that attracted the turtles toward "land") and natural cues (a dark silhouette of the dune behind the beach) that promoted "seaward" orientation. Artificial lighting disrupted seaward crawling in the presence of low silhouettes, but not high silhouettes. Low silhouettes provided adequate cues for seaward crawling when the apparent brightness of artificial light was reduced. Based upon these results, we postulate that artificial light disrupts orientation by competing with natural cues. Current restoration practices at nesting beaches emphasize light reduction. However at many sites some lights cannot be modified. Our results suggest that pairing dune restoration (to enhance natural cues) with light reduction (to the extent possible) should significantly improve hatchling orientation, even at nesting beaches where lighting cannot be entirely eliminated.

Keywords Sea turtle; Orientation; Photopollution; Habitat restoration

Authors Danladi M. Umar, Milen G. Marinov, Martin Schorr, Hazel M. Chapman

Year 2012 Umar DM, Marinov MG, Schorr M, Chapman HM

Report Name Odonata attracted by light—a new topic for myth-busters

Publication International Dragonfly Fund (IDF)

Issue-page numbers IDF-Report 43 (2012):

URL http://dragonflyfund.org/mediapool/88/888478/data/IDF_Report_43_Umar_Marinov_Schorr_Chapman_2012.pdf

Abstract Six Odonata species were collected during night light trapping on the Mambilla Pla-teau, Taraba State Nigteau, Nigeria. Being predominantly diurnal insects, odonates captured eria. Being predominantly diurnal insects, odonates captured eria. Being predominantly diurnal insects, odonates captured in light traps have always been considered as an anomaly.

Keywords

Authors Upgren, A.R.

Year 1996 Upgren AR

Report Name Night blindness: Light pollution is changing astronomy, the environment, and our experience of nature

Publication Amicus Journal;

Issue-page numbers Journal Volume: 17; Journal Issue: 4; 22-25

URL http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=160016

Abstract The ability to see a clear sky has been part of the American environmental ethic since at least 1977, when the Clean Air Act Amendments established visibility un US parks and wilderness areas as an environmental goal of national priority. But the night sky has had no such protection - unchecked light pollution means that in a moderately illuminated suburb only 300 stars can be seen now compared to 2,500 under ideal conditions. Astronomers, even as far away and up as 14,000 feet above sea level are beginning to feel the effects. The lose to the human spirit is another effect, and the real interference with ecological functions keyed to celestial patterns is presenting major problems to some animals and birds. This article discusses general aspects of the problem and some specific situations in which the problem was identified and tackeded in some way.

Keywords

Authors Hans Van Dyck

Year 2011 Van Dyck H

Report Name Changing organisms in rapidly changing anthropogenic landscapes: the significance of the 'Umwelt'-concept and functional habitat for animal conservation

Publication Evolutionary Applications

Issue-page numbers Early View (Online Version of Record published before inclusion in an issue)

URL <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-4571.2011.00230.x/full>

Abstract There is a growing recognition for the significance of evolutionary thinking in ecology and conservation biology. However, ecology and conservation studies often work with species-specific, fixed traits that ignore intraspecific variation. The way the habitat of a species is considered is an example of typological thinking biased by human perception. Structural habitat units (e.g., land cover types) as perceived by humans may not represent functional habitat units for other organisms. Human activity may also interfere with the environmental information used by organisms. Therefore, the Umwelt-concept from ethology needs to be integrated in the way we think about habitat and habitat selection. It states that different organisms live in different perceptual worlds dealing with specific subsamples of the environment as a result of their evolutionary and developmental history. The resource-based habitat concept is a functional habitat model based on resource distributions (consumables and conditions) and individual movements. This behavioural approach takes into account aspects that relate to the perceptual world of organisms. This approach may offer new opportunities for conservation and may help avoid failures with habitat restoration. Perceptual ability may be subject to adaptive change, but it may also constrain organisms from showing adaptive behaviours in rapidly changing environments.

Keywords animal behaviour; conservation biology; environment; habitat concept; niche construction; niche evolution; perception, light pollution

Authors Frank van Langevelde, Jody A. Ettema, Maurice Donners, Michiel F. WallisDeVries, Dick Groenendijk

Year 2011 van Langevelde F, Ettema JA, Donners M, et al.

Report Name Effect of spectral composition of artificial light on the attraction of moths

Publication Biological Conservation

Issue-page numbers Volume 144, Issue 9, September 2011, Pages 2274-2281

URL <http://www.sciencedirect.com/science/article/pii/S000632071100231X>

Abstract During the last decades, artificial night lighting has increased globally, which largely affected many plant and animal species. So far, current research highlights the importance of artificial light with smaller wavelengths in attracting moths, yet the effect of the spectral composition of artificial light on species richness and abundance of moths has not been studied systematically. Therefore, we tested the hypotheses that (1) higher species richness and higher abundances of moths are attracted to artificial light with smaller wavelengths than to light with larger wavelengths, and (2) this attraction is correlated with morphological characteristics of moths, especially their eye size. We indeed found higher species richness and abundances of moths in traps with lamps that emit light with smaller wavelengths. These lamps attracted moths with on average larger body mass, larger wing dimensions and larger eyes. Cascading effects on biodiversity and ecosystem functioning, e.g. pollination, can be expected when larger moth species are attracted to these lights. Predatory species with a diet of mainly larger moth species and plant species pollinated by larger moth species might then decline. Moreover, our results indicate a size-bias in trapping moths, resulting in an overrepresentation of larger moth species in lamps with small wavelengths. Our study indicates the potential use of lamps with larger wavelengths to effectively reduce the negative effect of light pollution on moth population dynamics and communities where moths play an important role.

Keywords Light pollution; Cascading effects; Body-size dependent effect; Ecology of the night; Lepidoptera

Authors LARRY N. VANDERHOEF2, PETER H. QUAIL, AND WINSLOW R. BRIGGS

Year 1979 Vanderhoef LN, Quail PH, Briggs WR

Report Name Red light inhibited mesocotyl elongation in maize seedlings

Publication Plant Physiol.

Issue-page numbers 63, 1062-1067

URL <http://www.plantphysiol.org/content/63/6/1062.full.pdf>

Abstract Red light induces two distinct inhibition responses in mesocotyls of etiolated corn seedlings. A light dose of 10 nanoeinsteins per square centimeter is saturating for the more sensitive response, whereas doses above 1,000 nanoeinsteins per square centimeter are required to exceed the threshold sensitivity of the less sensitive one. The sensitive response can be detected within 20 minutes of the onset of illumination whereas the other response does not become apparent until more than 4 hours after the beginning of irradiation. The reciprocity law is valid for the first response, but probably not for the second. An action spectrum for the first response shows two maxima, one at 640 nanometers and the other between 660 and 670 nanometers, with a pronounced minimum near 650 nanometers. The effects both of 640 and 665 nanometers of light were reversible by far red light, but doses of far red required for full reversibility were almost three orders of magnitude greater than the doses of red required either to saturate the initial inhibition or to reverse the effect of far red light. The results suggest that corn may contain a red-absorbing pigment other than phytochrome which in some way interacts with phytochrome in the inhibition of mesocotyl elongation by red light.

Keywords

Authors Verheijen, F J

Year 1985 Verheijen FJ

Report Name Photopollution: artificial light optic spatial control systems fail to cope with. Incidents, causation, remedies

Publication Exp Biol

Issue-page numbers 1985;44(1):1-18.

URL <http://www.ncbi.nlm.nih.gov/pubmed/3896840>

Abstract The term photopollution is proposed for artificial light having adverse effects on wildlife. The differences between natural and artificial light are discussed in relation to the concepts of orientation, disorientation, misorientation and abnormal orientation. The ways in which optic orientation systems are attuned to natural illumination conditions are analysed, and it is shown why they therefore may fail to cope with artificial light. It is concluded that for many nocturnally active animals a natural light-field between sunset and sunrise is a requirement for survival. A review is given of data on a) bird kills at man-made lighted obstacles, and b) the interference of artificial light with nest site selection by female sea turtles and water-finding by hatchlings at nesting beaches. Conventional remedies against the hazards of photopollution are critically reviewed and new ones are suggested. It is emphasized that measures should aim not only at reducing threats to a species or population but also at preventing suffering in individual animals.

Keywords

Authors Verheijen F.J.

Year 1981 Verheijen FJ

Report Name Birds killed at lighted man-made structures: not on night close to full moon

Publication American birds

Issue-page numbers 35, 251-254

URL <http://elibrary.unm.edu/sora/NAB/v035n03/p00251-p00254.pdf>

Abstract N/A

Keywords

Authors Verheijen, F.J.

Year 1960 Verheijen, F.J.

Report Name The Mechanisms of the Trapping Effect of Artificial Light Sources Upon Animals

Publication Archives Néerlandaises de Zoologie

Issue-page numbers Volume 13, Number 1, 1960 , pp. 1-107(107)

URL <http://www.ingentaconnect.com/content/brill/anz/1960/00000013/00000001/art00001>

Abstract Attempts were made to find out why insects and fishes can be captured with the help of lamps, why birds fly against lighthouse lanterns, and why in the laboratory phototaxis is preponderantly positive phototaxis. An extensive review of the literature revealed that none of the numerous old and new theories on photic orientation can account for either of these phenomena. Analysis of the abundance of data on the trapping effect of an artificial light source upon insects, fishes and birds has led to the working hypothesis according to which the low illumination intensity of the environment around such a light source interferes with normal photic orientation resulting in a drift of the animal towards the light source. The observed concentration of animals in the vicinity of a lamp is thought to be the statistical result of this drift. Experiments with insects (bees) demonstrated that an adequate screening of the light scattered from the sky, together with the elimination of the reflection of light by the environment really result in a disorientated drift towards the light source, even when this is the natural light source (the sun). Fishes and birds were forced to move towards a lamp under similar illumination conditions. Photic orientation is assumed to be accomplished by the goal-directed functioning of a number of hierarchically coordinated centres. The animal's movements are controlled by optic feedback based upon the normal differences in the intensities of the light stimuli acting upon the respective photosensitive surfaces. During more detailed orientation, fixation mechanisms are put in circuit by higher coordinating centres in response to sign stimuli. The normal values of these stimuli are determined by the normal angular light distribution in the animal's habitat, which is caused by: i. the nature of the light sources (sun, moon, stars); 2. the scattering and absorbing capacities of the media (the atmosphere and the water) ; and 3. the reflecting capacity of the environment. The abnormal feedback resulting from the abnormal angular light distribution around a lamp-brought about by the elimination of the factors 2 and 3-makes the animal deviate from the intended position or direction of locomotion. Moreover, the servomechanisms of lower coordination levels controlling the fixation movements of the eyes become a play-thing of the stimuli from the lamp that are quantitatively supernormal as compared with the adequate sign stimuli which normally activate the higher coordination centres of the fixation mechanisms. In this way these higher centres are more or less eliminated from the orientation process. Under extreme laboratory illumination conditions this results in a forced drift of the animal towards the lamp irrespective of factors which are incompatible with survival. Similar phenomena in human beings suffering from disturbance of the centres mediating eye movements, and in patients with far advanced cerebral degenerations (apallic syndrome) are thought to favour this concept. The implications of the present concept of photic orientation and disorientation are discussed with regard to the current concepts of photo-taxis and photokinesis, the light trap technique, some optical illusions, and glaring lights in traffic. The tendency among cyberneticians to overrate the performances of life-imitating-e.g. "phototropic"- machines, which trifle with the complexity of living organisms, is criticized.

Keywords

Authors Christian C. Voigt and Daniel Lewanzik

Year 2011 Voigt CC, Lewanzik D

Report Name Trapped in the darkness of the night: thermal and energetic constraints of daylight flight in bats

Publication Proc Biol Sci

Issue-page numbers August 7; 278(1716): 2311–2317.

URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3119008/>

Abstract Bats are one of the most successful mammalian groups, even though their foraging activities are restricted to the hours of twilight and night-time. Some studies suggested that bats became nocturnal because of overheating when flying in daylight. This is because—in contrast to feathered wings of birds—dark and naked wing membranes of bats efficiently absorb short-wave solar radiation. We hypothesized that bats face elevated flight costs during daylight flights, since we expected them to alter wing-beat kinematics to reduce heat load by solar radiation. To test this assumption, we measured metabolic rate and body temperature during short flights in the tropical short-tailed fruit bat *Carollia perspicillata* at night and during the day. Core body temperature of flying bats differed by no more than 2°C between night and daytime flights, whereas mass-specific CO₂ production rates were higher by 15 per cent during daytime. We conclude that increased flight costs only render diurnal bat flights profitable when the relative energy gain during daytime is high and risk of predation is low. Ancestral bats possibly have evolved dark-skinned wing membranes to reduce nocturnal predation, but a low degree of reflectance of wing membranes made them also prone to overheating and elevated energy costs during daylight flights. In consequence, bats may have become trapped in the darkness of the night once dark-skinned wing membranes had evolved.

Keywords locomotion, hyperthermia, energetics, optimal foraging, Chiroptera

Authors Chin-Meng Wang, Lih-Ren Chen, Shuen-Rong Lee, Yu-Shine Jea, Jung-Yie Kao

Year 2009 Wang C, Chen L, Lee S, et al.

Report Name Supplementary artificial light to increase egg production of geese under natural lighting conditions

Publication Animal Reproduction Science

Issue-page numbers Volume 113, Issues 1-4, July 2009, Pages 317-321

URL <http://www.sciencedirect.com/science/article/pii/S0378432008002479>

Abstract A new supplementary lighting program was designed to increase the egg production of geese under natural light conditions. The objective of this study was to evaluate the effects of the supplementary lighting program on egg production of White Roman geese in an open housing system at the Tropic of Cancer. Forty mature White Roman geese were randomly allocated into two groups (male:female = 1:4). The supplementary lighting program with a total daily photoperiod of between 12.0 h and 13.5 h was initiated on 1 November and withdrawn from the experimental group on 30 January. In contrast, the geese in the control group were kept under natural lighting conditions throughout this study. The results showed that the laying peak of the experimental group occurred earlier than normal in the reproductive season and the geese continued laying throughout the breeding season. The geese in the experimental group had 47.6 eggs/goose which was significantly ($P < 0.05$) more than that of the control group having 26.4 eggs/goose. We can conclude that the supplemental lighting method will result in an earlier laying peak of the geese in the breeding season and higher egg production. The supplementary lighting program was able to maximize egg production in geese at the Tropic of Cancer.

Keywords Geese; Lighting program; Egg production

Authors Yin Wang, Ko Noguchi and Ichiro Terashima

Year 2011 Wang Y, Noguchi K, Terashima I

Report Name Photosynthesis-Dependent and -Independent Responses of Stomata to Blue, Red and Green Monochromatic Light: Differences Between the Normally Oriented and Inverted Lea

Publication Plant Cell Physiol

Issue-page numbers (2011) 52 (3): 479-489. doi: 10.1093/pcp/pcr005

URL <http://pcp.oxfordjournals.org/content/52/3/479.short>

Abstract The effects of growth light environment on stomatal light responses were analyzed. We inverted leaves of sunflower (*Helianthus annuus*) for 2 weeks until their full expansion, and measured gas exchange properties of the adaxial and abaxial sides separately. The sensitivity to light assessed as the increase in stomatal conductance was generally higher in the abaxial stomata than in the adaxial stomata, and these differences could not be completely changed by the inversion treatment. We also treated the leaves with DCMU to inhibit photosynthesis and evaluated the photosynthesis-dependent and -independent components of stomatal light responses. The red light response of stomata in both normally oriented and inverted leaves relied only on the photosynthesis-dependent component. The blue light response involved both the photosynthesis-dependent and photosynthesis-independent components, and the relative contributions of the two components differed between the normally oriented and inverted leaves. A green light response was observed only in the abaxial stomata, which also involved the photosynthesis-dependent and photosynthesis-independent components, strongly suggesting the existence of a green light receptor in sunflower leaves. Moreover, acclimation of the abaxial stomata to strong direct light eliminated the photosynthesis-independent component in the green light response. The results showed that stomatal responses to monochromatic light change considerably in response to growth light environment, although some of these responses appear to be determined inherently.

Keywords

Authors Zachary M. Weil, Lynn B. Martin II, and Randy J. Nelson

Year 2006 Weil ZM, Martin LB II, Nelson RJ

Report Name Photoperiod Differentially Affects Immune Function and Reproduction in Collared Lemmings (*Dicrostonyx groenlandicus*)

Publication Journal of Biological Rhythms

Issue-page numbers October 2006; vol. 21, 5: pp. 384-393.

URL <http://jbr.sagepub.com/content/21/5/384.abstract>

Abstract Many nontropical rodent species experience predictable annual variation in resource availability and environmental conditions. Individuals of many animal species engage in energetically expensive processes such as breeding during the spring and summer but bias investment toward processes that promote survival such as immune function during the winter. Generally, the suite of responses associated with the changing seasons can be induced by manipulating day length (photoperiod). Collared lemmings (*Dicrostonyx groenlandicus*) are arvicoline rodents that inhabit parts of northern Canada and Greenland. Despite the extreme conditions of winter in their native habitat, these lemmings routinely breed during the winter. In the laboratory, collared lemmings have divergent responses to photoperiod relative to other seasonally breeding rodents; short day lengths can stimulate, rather than inhibit, the reproductive system. Male and female collared lemmings were maintained for 11 weeks in 1 of 3 photoperiods (LD 22:2, LD 16:8, or LD 8:16) that induce markedly different phenotypes. Following photoperiod treatment, cell-mediated immune function as assessed by delayed-type hypersensitivity reactions was elevated in lemmings housed in LD 16:8 and LD 8:16 relative to LD 22:2. However, antibody production to a novel antigen was unaffected by photoperiod. Exposure to LD 8:16 induced weight gain, molt to a winter pelage, and in contrast to previous studies, regression of the male, but not the female, reproductive tract. In conclusion, these data indicate that components of immune function among collared lemmings are responsive to changes in day length.

Keywords

Authors Ron D Weir

Year 1976 Weir RD

Report Name Annotated bibliography of bird kills at man-made obstacles: a review of the state of the art and solutions

Publication Ottawa : Dept. of Fisheries and the Environment, Environmental Management Service

Issue-page numbers Canadian Wildlife Service, Ontario Region

URL <http://www.worldcat.org/title/annotated-bibliography-of-bird-kills-at-man-made-obstacles-a-review-of-the-state-of-the-art-and-solutions/oclc/4782061>

Abstract Book

Keywords

Authors David Welch

Year 1998 Welch D

Report Name Air Issues and Ecosystem Protection, a Canadian National Parks Perspective

Publication Environmental Monitoring and Assessment

Issue-page numbers Volume 49, Numbers 2-3, 251-262, DOI: 10.1023/A:1005842825220

URL <http://www.springerlink.com/content/x4148475m0hp5007/>

Abstract Several case histories illustrate national park air issues and responses in Canada. These examples include: acidification studies and establishment of a multiparticipant monitoring programme at Kejimikujik; studies of smoke at campgrounds in Jasper, La Mauricie and Forillon, its effect on health, and the management of visitors and firewood supply to mitigate these risks; and estimates of emissions from through-traffic in Yoho. From these cases and from reviews of the secondary literature, we can identify air issues that affect the maintenance of ecological integrity in national parks. These issues are: forest fires and smoke management; defining goals for ecosystem restoration; representation of natural regional conditions; visitor health and amenity; acidification; pesticides; eutrophication from airborne nitrates; permafrost melting; and UV-B. In June 1995, an International Air Issues Workshop brought together representatives from Canadian and U.S. national parks and other selected agencies. They ranked the air issues affecting national parks, producing quite an eclectic list. From the most to least serious issue, they are: acidification, toxics, visibility impairment, UV-B, smoke management, oil and gas development, fugitive dust, global warming, overflights, light pollution, noise and odour. Note that atmospheric change is only one among a group of stresses affecting national parks. Of 28 stresses recognized as significant for national parks in 1992, acid precipitation ranked 8th and climate change 23rd. Petrochemicals, 17th, pesticides, 18th and heavy metals, 21st, may be partly airborne. The 1995 workshop made several recommendations applicable to Parks Canada, from which those related to research and monitoring needs have been extracted. The air monitoring needed most by national parks is of suspended particulate and visibility. This is in response to human health and amenity concerns and international treaty obligations. The long-term protection of natural sites in national parks provides opportunities for other agencies to monitor ambient air quality and ecosystem responses, for example through the installation of under-canopy monitoring towers. The air research most needed in national parks is the modelling of natural landscapes and vegetation complexes in response to climate change. This follows from the primary purpose of each national park, to maintain the ecological integrity of an area selected to represent a natural region. The principal air research opportunities for other agencies in national parks are probably intensive instrumentation and sampling over several years to examine the air-vegetation-soil transfers of nutrients, pollutants and radiation.

Keywords

Authors Wenden B, Kozma-Bognár L, Edwards KD, Hall AJ, Locke JC, Millar AJ.

Year 2011 Wenden B, Kozma-Bognár L, Edwards KD, et al.

Report Name Light inputs shape the Arabidopsis circadian system.

Publication Plant J

Issue-page numbers 2011 May;66(3):480-91. doi: 10.1111/j.1365-313X.2011.04505.x. Epub 2011 Mar 4.

URL <http://www.ncbi.nlm.nih.gov/pubmed/21255161>

Abstract The circadian clock is a fundamental feature of eukaryotic gene regulation that is emerging as an exemplar genetic sub-network for systems biology. The circadian system in Arabidopsis plants is complex, in part due to its phototransduction pathways, which are themselves under circadian control. We therefore analysed two simpler experimental systems. Etiolated seedlings entrained by temperature cycles showed circadian rhythms in the expression of genes that are important for the clock mechanism, but only a restricted set of downstream target genes were rhythmic in microarray assays. Clock control of phototransduction pathways remained robust across a range of light inputs, despite the arrhythmic transcription of light-signalling genes. Circadian interactions with light signalling were then analysed using a single active photoreceptor. Phytochrome A (phyA) is expected to be the only active photoreceptor that can mediate far-red (FR) light input to the circadian clock. Surprisingly, rhythmic gene expression was profoundly altered under constant FR light, in a phyA-dependent manner, resulting in high expression of evening genes and low expression of morning genes. Dark intervals were required to allow high-amplitude rhythms across the transcriptome. Clock genes involved in this response were identified by mutant analysis, showing that the EARLY FLOWERING 4 gene is a likely target and mediator of the FR effects. Both experimental systems illustrate how profoundly the light input pathways affect the plant circadian clock, and provide strong experimental manipulations to understand critical steps in the plant clock mechanism.

Keywords

Authors David Whitmore, Nicholas S. Foulkes & Paolo Sassone-Corsi

Year 2000 Whitmore D, Foulkes NS, Sassone-Corsi P

Report Name Light acts directly on organs and cells in culture to set the vertebrate circadian clock

Publication Nature

Issue-page numbers 404, 87-91 (2 March 2000) | doi:10.1038/35003589

URL <http://www.nature.com/nature/journal/v404/n6773/abs/404087a0.html>

Abstract The expression of clock genes in vertebrates is widespread and not restricted to classical clock structures^{1, 2}. The expression of the Clock gene in zebrafish shows a strong circadian oscillation in many tissues in vivo and in culture, showing that endogenous oscillators exist in peripheral organs³. A defining feature of circadian clocks is that they can be set or entrained to local time, usually by the environmental light–dark cycle^{4, 5}. An important question is whether peripheral oscillators are entrained to local time by signals from central pacemakers such as the eyes or are themselves directly light-responsive. Here we show that the peripheral organ clocks of zebrafish are set by light–dark cycles in culture. We also show that a zebrafish-derived cell line contains a circadian oscillator, which is also directly light entrained.

Keywords

Authors Wiese FK, Montevecchi WA, Davoren GK, Huettmann F, Diamond AW, Linke J.

Year 2001 Wiese FK, Montevecchi WA, Davoren GK, et al.

Report Name Seabirds at risk around offshore oil platforms in the North-west Atlantic

Publication Mar Pollut Bull

Issue-page numbers Dec;42(12):1285-90.

URL <http://www.ncbi.nlm.nih.gov/pubmed/11827114>

Abstract Seabirds aggregate around oil drilling platforms and rigs in above average numbers due to night lighting, flaring, food and other visual cues. Bird mortality has been documented due to impact on the structure, oiling and incineration by the flare. The environmental circumstances for offshore hydrocarbon development in North-west Atlantic are unique because of the harsh climate, cold waters and because enormous seabird concentrations inhabit and move through the Grand Banks in autumn (storm-petrels, *Oceanodroma* spp), winter (dovekies, *Alle alle*, murre, *Uria* spp), spring and summer (shearwaters, *Puffinus* spp). Many species are planktivorous and attracted to artificial light sources. Most of the seabirds in the region are long-distance migrants, and hydrocarbon development in the North-west Atlantic could affect both regional and global breeding populations. Regulators need to take responsibility for these circumstances. It is essential to implement comprehensive, independent arm's length monitoring of potential avian impacts of offshore hydrocarbon platforms in the North-west Atlantic. This should include quantifying and determining the nature, timing and extent of bird mortality caused by these structures. Based on existing evidence of potential impacts of offshore hydrocarbon platforms on seabirds, it is difficult to understand why this has not been, and is not being, systematically implemented.

Keywords

Authors Tim Wijgerde, Peter Henkemansa, Ronald Osinga

Year 2012 Wijgerde T, Henkemansa P, Osinga R

Report Name Effects of irradiance and light spectrum on growth of the scleractinian coral *Galaxea fascicularis* — Applicability of LEP and LED lighting to coral aquaculture

Publication Aquaculture

Issue-page numbers Volumes 344–349, 21 May 2012, Pages 188–193

URL <http://www.sciencedirect.com/science/article/pii/S004484861200186X>

Abstract Due to global degradation of coral reefs and high demand for scleractinian corals, aquaculture of these marine organisms is gaining importance. To make coral aquaculture economically viable, optimisation of culture protocols is vital. We determined the effects of irradiance and light spectrum on the growth of a model scleractinian coral species, *Galaxea fascicularis* (Linnaeus 1767). Single polyps ($n = 10$) were cultured under six different treatments; LED (light emitting diode) at a PPFD of 40–60, 125–150 and 275–325 $\mu\text{mol m}^{-2} \text{s}^{-1}$; and LEP (light emitting plasma) at a PPFD of 40–60, 125–150 and 275–325 $\mu\text{mol m}^{-2} \text{s}^{-1}$. Specific growth and survival rates were monitored over a 69-day interval. Mean specific growth rates were $0.031 \pm 0.006 \text{ day}^{-1}$ for the LED 40–60 treatment, $0.030 \pm 0.007 \text{ day}^{-1}$ for LED 125–150, $0.022 \pm 0.009 \text{ day}^{-1}$ for LED 275–325, $0.024 \pm 0.011 \text{ day}^{-1}$ for LEP 40–60, $0.040 \pm 0.008 \text{ day}^{-1}$ for LEP 125–150, and $0.031 \pm 0.006 \text{ day}^{-1}$ for LEP 275–325. Coral survival rate at the end of the growth interval was 95%. A significant main effect of irradiance on coral specific growth rate was found (factorial ANOVA, $P = 0.018$), whereas spectrum did not show a significant main effect (factorial ANOVA, $P = 0.085$). A significant interactive effect between irradiance and spectrum was found (factorial ANOVA, $P = 0.013$), as LEP lighting resulted in higher coral growth rates at the two higher irradiance levels applied. The effect of irradiance and its interaction with spectrum were likely modulated by water flow rates. Our results show that balanced as well as light sources skewed towards the blue part of the spectrum result in high coral growth. Specifically, LEP and LED have shown to be suitable lighting technologies for coral aquaculture, where LEP yields higher *G. fascicularis* growth rates at higher irradiance levels.

Keywords

Authors Malcolm B Wilkins
Year 1984 Wilkins MB
Report Name Phototropism
Publication in: Advanced Plant Physiology
Issue-page numbers London ; Marshfield, Mass. : Pitman, 149-162
URL <http://www.worldcat.org/title/advanced-plant-physiology/oclc/10147518>

Abstract

Keywords

Authors Wolfgang Wiltschko, Ursula Munro, Hugh Ford & Roswitha Wiltschko
Year 1993 Wiltschko W, Munro U, Ford H, Wiltschko R
Report Name Red light disrupts magnetic orientation of migratory birds
Publication Nature
Issue-page numbers 364, 525 - 527 (05 August 1993); doi:10.1038/364525a0
URL <http://www.nature.com/nature/journal/v364/n6437/abs/364525a0.html>

Abstract THE transduction mechanisms and the neurophysiological basis of magnetoreception in birds are still largely unexplained, even though the role of the magnetic compass in the orientation of birds is fairly well understood¹. The discussion on magnetoreception in birds and terrestrial vertebrates focuses mainly on two mechanisms: small particles of magnetite^{2,3} and biochemical bi-radical reactions of excited macromolecules^{4,5}. When the bi-radical hypothesis was first proposed, magnetic resonance phenomena in the retina were suggested as the primary processes⁴, which led to the question of whether magnetoreception was light-dependent. Homing experiments⁶ and electrophysiological evidence⁷ from pigeons have produced evidence consistent with such a mechanism. An effect of the spectral composition of light on magnetic compass orientation in amphibians has recently been described⁸: under blue light of 450 nm and below, newts oriented as they did under the full spectrum, whereas they showed a roughly 90° counterclockwise shift when tested under wavelengths at or above 500 nm. Here we report the first orientation tests on migratory birds under light of different wavelengths; the results suggest a light-dependent process that appears to differ from that reported in newts.

Keywords

Authors Blair E. Witherington, Karen A. Bjorndal

Year 1991 Witherington B, Bjorndal K

Report Name Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles *Caretta caretta*

Publication Biological Conservation

Issue-page numbers Volume: 55, Issue: 2, Pages: 139-149

URL <http://www.mendeley.com/research/influences-of-artificial-lighting-on-the-seaward-orientation-of-hatchling-loggerhead-turtles-caretta-caretta/>

Abstract The seaward orientation behavior of hatchling loggerhead turtles *Caretta caretta* when exposed to five different artificial light sources (high-pressure) and low-pressure sodium vapor, and yellow, red, and white incandescent lamps) was examined. Each light source affected hatchling sea-finding performance either in direction of orientation or width of dispersion. Hatchlings were attracted to light sources emitting short-wavelength visible light and long-wavelength sources that excluded intermediate wavelengths. A negative response was observed toward sources emitting predominately yellow light. For this reason, low-pressure sodium vapor (LPS) luminaires, which emit only yellow light, are expected to affect loggerhead hatchling sea-finding minimally, if positioned behind the primary dune. LPS luminaires positioned between emerging hatchlings and the ocean, however, will disrupt hatchling orientation.

Keywords

Authors	Blair E. Witherington
Year	1992 Witherington BE
Report Name	Behavioral responses of nesting sea turtles to artificial lighting
Publication	Herpetologica
Issue-page numbers	Vol. 48, No. 1 (Mar., 1992), pp. 31-39
URL	http://www.jstor.org/pss/3892916

Abstract

Effects of artificial lighting on loggerhead (*Caretta caretta*) and green turtle (*Chelonia mydas*) nesting behavior were determined experimentally at major nesting beaches: Melbourne Beach, Florida, USA (loggerheads) and Tortuguero, Costa Rica (green turtles). I conducted experiments in which a portion of each nesting beach remained dark, or was illuminated with white, mercury vapor (MV) or yellow, low pressure sodium vapor (LPS) luminaires of equal luminance. Lighting beaches with MV luminaires significantly reduced the numbers of green turtles and loggerheads emerging and nesting within lighted study areas. Lighting beaches with LPS luminaires had no significant effect on nesting in either species. Some turtles were misdirected by lighted luminaires (primarily mercury vapor) on their return to the ocean following nesting attempts. Lighted luminaires did not significantly affect the stages at which nesting attempts were abandoned nor the positioning of nests relative to dune vegetation. Results suggest that MV luminaires and other broad-spectrum lighting types have the potential to disrupt the nesting of loggerheads and green turtles. LPS luminaires may be an acceptable alternative where lighting on nesting beaches cannot be completely extinguished. /// Los efectos de la luz artificial en el comportamiento de las especies caguama (*Caretta caretta*) y la tortuga verde (*Chelonia mydas*) al hacer sus nidos fueron determinados experimentalmente en las playas principales de nidada: Melbourne Beach, Florida EUA (caguamas) y Tortuguero, Costa Rica (Tortugas verdes). Llevé a cabo experimentos en que una porción de cada playa de nidada permanecía oscura, o era iluminada con vapor de mercurio (MV) o con lumbreras de igual luminiscencia de vapor amarillo de sodio a baja presión (LPS). La iluminación de las playas con lumbreras MV redujo significativamente el número de tortugas verdes y caguamas saliendo y anidando dentro de las áreas de estudio iluminadas. La iluminación con lumbreras LPS no tuvo un efecto significativo en la nidada de ninguna de las especies. Algunas tortugas fueron mal dirigidas por las lumbreras encendidas (principalmente vapor de mercurio) en su regreso al océano después de sus intentos de anidar. Las lumbreras encendidas no afectaron significativamente las etapas en que los intentos de anidar fueron suspendidos ni tampoco la posición de los nidos en relación con la vegetación de las dunas. Los resultados sugieren que las lumbreras MV y otros tipos de iluminación de amplio espectro tienen el potencial de trastornar la nidada de las caguamas y las tortugas verdes. Las lumbreras LPS pueden ser una alternativa aceptable cuando la iluminación en las playas de nidada no puede ser completamente extinguida.

Keywords

Authors Blair E. Witherington

Year 1991 Witherington BE

Report Name Orientation of hatchling loggerhead turtles at sea off artificially lighted and dark beaches

Publication Journal of Experimental Marine Biology and Ecology

Issue-page numbers Volume 149, Issue 1, 1 July 1991, Pages 1-11

URL <http://www.sciencedirect.com/science/article/pii/002209819190113B>

Abstract 42 hatchling loggerhead turtles *Caretta caretta* L. were released at lighted and dark beach sites on the east coast of Florida, USA, and tracked as they swam offshore during daytime and nighttime trials at each site (four groups). Hatchlings from each group swam in straight paths in generally seaward directions. Hatchlings from both NNE-facing (dark beach) and SSE-facing (lighted beach) beaches swam approximately perpendicular to the shore. No differences were found among groups in path straightness or in orientation direction relative to the shoreline surrounding the release point. Hatchlings swimming from the lighted beach at night, however, swam more slowly and had a larger angle of dispersion than did hatchlings from the dark beach at night. Beach lighting was among other site characteristics that may have influenced these behaviors.

Keywords *Caretta caretta*; Migration; Orientation; Photopollution; Sea turtle; Tracking

Authors Witherington, B.E.

Year 1997 Witherington BE

Report Name The problem of photopollution for sea turtles and other nocturnal animals

Publication Behavioral Approaches to Conservation in the Wild

Issue-page numbers p. 303-328

URL http://research.myfwc.com/publications/publication_info.asp?id=40848

Abstract N/A

Keywords

Authors Witherington, B. E. and R. E. Martin

Year 2003 Witherington BE, Martin RE

Report Name Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches

Publication Fla. Mar. Res. Inst. Tech. Rep.

Issue-page numbers 3rd Edition, TR-2c 86 p

URL <http://www.fws.gov/caribbean/es/PDF/Library%20Items/LightingManual-Florida.pdf>

Abstract

In the sliver of time since Europeans began migrating throughout the tropical oceans of the world, sea turtle populations have declined and many have been extirpated. As a group, sea turtles are considered dangerously close to extinction. Because of their precarious status, sea turtles have been afforded protection by local, state, provincial, and national laws and by international treaties. In the United States and its territories, the Endangered Species Act of 1973 prohibits all killing, harming, and harassment of six species of sea turtles: the green turtle (*Chelonia mydas*), the loggerhead (*Caretta caretta*), the hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kemp*i), the olive ridley (*Lepidochelys olivacea*), and the leatherback (*Dermochelys coriacea*).

It is perhaps on ocean beaches where the activities of people and sea turtles are most conspicuously intertwined. On these narrow strips of sand, people live, recreate, and conduct commerce—and sea turtles come to reproduce. Although sea turtles spend very little of their lives on beaches, their activities there are critical to the creation of the next generation. Sea turtles leave little more disturbance on the beach than a mound of sand and are likely to make no more of an impression on human inhabitants than to awaken a sense of wonder. Humans, however, can cause profound environmental changes in the places they visit. The consequences of such changes for sea turtles can be severe and are of great concern to those working for sea turtle conservation. An integral goal of sea turtle conservation efforts is to reduce deleterious human effects such as habitat alteration. In this manual, we will examine a distinctive and particularly damaging type of habitat alteration that affects sea turtles at the nesting beach, namely, light pollution—the introduction of artificially produced detrimental light into the environment. Light from artificial sources differs markedly from other pollutants both in its form—light is energy rather than substance—and in its effect on sea turtles. Whereas heavy metal, petroleum, and other chemical pollutants produce predominately physical

or physiological effects, the effect that light pollution has on sea turtles is essentially psychological. For sea turtles, artificial light is best described not as a toxic material but as misinformation. With its great potential to disrupt behaviors that rely on correct information, artificial lighting can have profound effects on sea turtle survival. Critical sea turtle behaviors affected by light pollution include the selection of nesting sites by adult turtles and the movement off the beach by hatchlings and adults. Raymond (1984a) presented the first summary of the effects of light pollution on hatchling sea turtles and some potential solutions to this problem. The present manual can be considered an expanded update of the material presented by Raymond. Our goals here are to offer new perspectives on the problem of light pollution at sea turtle nesting beaches and to present recently acquired information both on the problem itself and on the strategies and mechanics by which the problem can be solved. Our presentation is geared for biologists, conservationists, and managers who may be consulted about or charged with solving problems caused by artificial lighting on sea turtle nesting beaches. However, this manual is also meant to inform the lay person who may work or live near a nesting beach and is concerned about sea turtle conservation.

Keywords

Authors Witherington, B. E. and R. E. Martin

Year 1996 Witherington BE, Martin RE

Report Name Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches

Publication Fla. Mar. Res. Inst. Tech. Rep.

Issue-page numbers TR-2. 73 p

URL http://research.myfwc.com/publications/publication_info.asp?id=39080

Abstract Sea turtle populations have suffered worldwide declines, and their recovery largely depends upon our managing the effects of expanding human populations. One of these effects is light pollution - the presence of detrimental artificial light in the environment. Of the many ecological disturbances caused by human beings, light pollution may be among the most manageable. Light pollution on nesting beaches is detrimental to sea turtles because it alters critical nocturnal behaviors, namely, how sea turtles choose nesting sites, how they return to the sea after nesting, and how hatchlings find the sea after emerging from their nests. Both circumstantial observations and experimental evidence show that artificial lighting on beaches tends to deter sea turtles from emerging from the sea to nest. Because of this, effects from artificial lighting are not likely to be revealed by a ratio of nests to false crawls (tracks showing abandoned nesting attempts on the beach). Although there is a tendency for turtles to prefer dark beaches, many do nest on lighted shores, but in doing so, the lives of their hatchlings are jeopardized. This threat comes from the way that artificial lighting disrupts a critical nocturnal behavior of hatchlings - crawling from their nest to the sea. On naturally lighted beaches, hatchlings escaping from nests show an immediate and well-directed orientation toward the water. This robust sea-finding behavior is innate and is guided by light cues that include brightness, shape, and in some species, color. On artificially lighted beaches, hatchlings become misdirected by light sources, leaving them unable to find the water and likely to incur high mortality from dehydration and predators. Hatchlings become misdirected because of their tendency to move in the brightest direction, especially when the brightness of one direction is overwhelmingly greater than the brightness of other directions, conditions that are commonly created by artificial light sources. Artificial lighting on beaches is strongly attractive to hatchlings and can cause hatchlings to move in the wrong direction (misorientation) as well as interfere with their ability to orient in a constant direction (disorientation). Understanding how sea turtles interpret light cues to choose nesting sites and to locate the sea in a variably lighted world has helped conservationists develop ways to identify and minimize problems caused by light pollution. Part of this understanding is of the complexity of lighting conditions on nesting beaches and of the difficulty of measuring light pollution with instrumentation. Thankfully, accurately quantifying light pollution is not necessary to diagnose a potential problem. We offer this simple rule: if light from an artificial source is visible to a person standing anywhere on a beach, then that light is likely to cause problems for the sea turtles that nest there. Because there is no single, measurable level of artificial brightness on nesting beaches that is acceptable for sea turtle conservation, the most effective conservation strategy is simply to use "best available technology" (BAT: a common strategy for reducing other forms of pollution by using the best of the pollution-reduction technologies available) to reduce effects from lighting as much as practicable. Best available technology includes many light-management options that have been used by lighting engineers for decades and others that are unique to protecting sea turtles. To protect sea turtles, light sources can simply be turned off or they can be minimized in number and wattage, repositioned behind structures, shielded, redirected, lowered, or recessed so that their light does not reach the beach. To ensure that lights are on only when needed, timers and motion-detector switches can be installed. Interior lighting can be reduced by moving lamps away from windows, drawing blinds after dark, and tinting windows. To protect sea turtles, artificial lighting need not be prohibited if it can be properly managed.

Keywords

Authors Witherington, B. E. and R. E. Martin
Year 2000 Witherington BE, Martin RE
Report Name Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches
Publication Fla. Mar. Res. Inst. Tech. Rep.
Issue-page numbers 2nd Edition, TR-2c 84 p
URL http://aquaticcommons.org/115/1/TR2_c.pdf

Abstract

Keywords

Authors Wright, A. H. and A. A. Wright
Year 1949 Wright AH, Wright AA
Report Name Handbook of Frogs and Toads of the United States and Canada
Publication Comstock Publishing Company, Ithaca, NY.
Issue-page numbers pp 167, 169, 188, 314, and 347
URL <http://www.amazon.com/Handbook-Frogs-United-States-Canada/dp/0801404622>

Abstract N/A

Keywords

Authors Yakobi, V. E.

Year 1978 Yakobi VE

Report Name Do the Plane Landing Lights Attract or Scare Headlights at Night?

Publication Zool. Zh.

Issue-page numbers 57(2), 304-306 (in Russian with English Summaries)

URL N/A

Abstract N/A

Keywords

Authors Morgan Young, Michael Salmon, Richard Forward

Year 2012 Young M, Salmon M, Forward R

Report Name Visual Wavelength Discrimination by the Loggerhead Turtle, *Caretta caretta*

Publication Biol. Bull.

Issue-page numbers February 1, 2012 vol. 222 no. 1 46-55

URL <http://www.biolbull.org/content/222/1/46.short>

Abstract Marine turtles are visual animals, yet we know remarkably little about how they use this sensory capacity. In this study, our purpose was to determine whether loggerhead turtles could discriminate between objects on the basis of color. We used light-adapted hatchlings to determine the minimum intensity of blue (450 nm), green (500 nm), and yellow (580 nm) visual stimuli that evoked a positive phototaxis (the phototaxis “threshold” [pt]). Juvenile turtles were later trained to associate each color (presented at 1 log unit above that color’s pt) with food, then to discriminate between two colors (the original rewarded stimulus plus one of the other colors, not rewarded) when both were presented at 1 log unit above their pt. In the crucial test, turtles were trained to choose between the rewarded and unrewarded color when the colors varied in intensity. All turtles learned that task, demonstrating color discrimination. An association between blue and food was acquired in fewer trials than between yellow and food, perhaps because some prey of juvenile loggerheads in oceanic surface waters (jellyfishes, polyps, and pelagic gastropods) are blue or violet in color.

Keywords

Authors Zanotti, F.

Year 1998 Zanotti F

Report Name Migrazioni notturne (in italian)

Publication Coelum

Issue-page numbers special issue, summer 1998

URL N/A

Abstract N/A

Keywords

Authors Zapka M, Heyers D, Liedvogel M, Jarvis ED, Mouritsen H.

Year 2010 Zapka M, Heyers D, Liedvogel M, et al.

Report Name Night-time neuronal activation of Cluster N in a day- and night-migrating songbird.

Publication Eur J Neurosci

Issue-page numbers 2010 Aug;32(4):619-24. Epub 2010 Jul 6.

URL <http://www.ncbi.nlm.nih.gov/pubmed/20618826>

Abstract Magnetic compass orientation in a night-migratory songbird requires that Cluster N, a cluster of forebrain regions, is functional. Cluster N, which receives input from the eyes via the thalamofugal pathway, shows high neuronal activity in night-migrants performing magnetic compass-guided behaviour at night, whereas no activation is observed during the day, and covering up the birds' eyes strongly reduces neuronal activation. These findings suggest that Cluster N processes light-dependent magnetic compass information in night-migrating songbirds. The aim of this study was to test if Cluster N is active during daytime migration. We used behavioural molecular mapping based on ZENK activation to investigate if Cluster N is active in the meadow pipit (*Anthus pratensis*), a day- and night-migratory species. We found that Cluster N of meadow pipits shows high neuronal activity under dim-light at night, but not under full room-light conditions during the day. These data suggest that, in day- and night-migratory meadow pipits, the light-dependent magnetic compass, which requires an active Cluster N, may only be used during night-time, whereas another magnetosensory mechanism and/or other reference system(s), like the sun or polarized light, may be used as primary orientation cues during the day.

Keywords

Authors Hongkui Zeng, Zuwei Qian, Michael P. Myers & Michael Rosbash

Year 1996 Zeng H, Qian Z, Myers MP, Rosbash M

Report Name A light-entrainment mechanism for the Drosophila circadian clock

Publication Nature

Issue-page numbers 380, 129 - 135 (14 March 1996); doi:10.1038/380129a0

URL <http://www.nature.com/nature/journal/v380/n6570/abs/380129a0.html>

Abstract Biochemical studies indicate that the Drosophila timeless protein (Tim) is a stoichiometric partner of the period protein (Per) in fly head extracts. A Per-Tim heterodimeric complex explains the reciprocal autoregulation of the proteins on transcription. The complex is under clock control, and many circadian features of the Tim cycle resemble those of the Per cycle. However, Tim is rapidly degraded in the early morning or in response to light, releasing Per from the complex. The Per-Tim complex is a functional unit of the Drosophila circadian clock, and Tim degradation may be the initial response of the clock to light.

Keywords

Authors Xiaowen Zhang, Shaona Cao, Youxun Li, Shanli Mou, Dong Xu, Xiao Fan and Naihao Ye

Year 0 Zhang X, Cao S, Li Y, et al.

Report Name Expression of Three Putative Early Light-Induced Genes Under Different Stress Conditions in the Green Alga *Ulva linza*

Publication Plant Molecular Biology Reporter

Issue-page numbers DOI: 10.1007/s11105-011-0411-5

URL <http://www.springerlink.com/content/6244435lx3730j28/>

Abstract *Ulva linza* is a photophilous alga commonly distributed in shallow and horizontal habitats, and it is also a major contributor to biofouling. Early light-induced protein (ELIP) is a stress-related member of the light-harvesting complex family that is part of the photoprotective mechanism in land plants. In this study, we identified three ELIP-like genes in *U. linza* and analyzed their messenger RNA (mRNA) levels under different stress conditions. Expression of the ELIP-like1 and ELIP-like2 genes was light triggered, and the amount of ELIP-like2 transcripts increased in a light intensity-dependent manner. The mRNA levels of ELIP-like2 significantly increased, reached a maximum within 1 h after the transfer from low-intensity light to high-intensity light, and then rapidly returned to a low level. The amount of ELIP-like1 transcripts was maintained during the first 2 h after the transfer from low light to high light and then declined. The accumulation of ELIP-like1 and ELIP-like2 transcripts was also triggered by exposure to cold temperature and low osmotic stresses. In contrast, different light intensities had little effect on the response of the ELIP-like3 gene, and the transfer from low light to high light caused a decrease in the mRNA levels in a manner similar to that seen for major light-harvesting genes. Furthermore, none of the stress conditions tested resulted in up-regulation of the expression of ELIP-like3. These results suggest that ELIP-like1 and ELIP-like2 may participate in photoprotection in *U. linza* under high light, cold temperature, and low osmotic stress conditions. However, ELIP-like3 acted more like a structural component of the photosynthetic membranes.

Keywords *Ulva linza*, ELIP-like, Expression analysis, Photoprotection

Authors Brian D. Zoltowski, Anand T. Vaidya, Deniz Top, Joanne Widom, Michael W. Young & Brian R. Crane

Year 2011 Zoltowski BD, Vaidya AT, Top D, et al.

Report Name Structure of full-length *Drosophila* cryptochrome

Publication Nature

Issue-page numbers Published online 13 November 2011 doi:10.1038/nature10618

URL <http://www.nature.com/nature/journal/vaop/ncurrent/full/nature10618.html>

Abstract The cryptochrome/photolyase (CRY/PL) family of photoreceptors mediates adaptive responses to ultraviolet and blue light exposure in all kingdoms of life^{1, 2, 3, 4, 5}. Whereas PLs function predominantly in DNA repair of cyclobutane pyrimidine dimers (CPDs) and 6-4 photolesions caused by ultraviolet radiation, CRYs transduce signals important for growth, development, magnetosensitivity and circadian clocks^{1, 2, 3, 4, 5}. Despite these diverse functions, PLs/CRYs preserve a common structural fold, a dependence on flavin adenine dinucleotide (FAD) and an internal photoactivation mechanism^{3, 6}. However, members of the CRY/PL family differ in the substrates recognized (protein or DNA), photochemical reactions catalysed and involvement of an antenna cofactor. It is largely unknown how the animal CRYs that regulate circadian rhythms act on their substrates. CRYs contain a variable carboxy-terminal tail that appends the conserved PL homology domain (PHD) and is important for function^{7, 8, 9, 10, 11, 12}. Here, we report a 2.3-Å resolution crystal structure of *Drosophila* CRY with an intact C terminus. The C-terminal helix docks in the analogous groove that binds DNA substrates in PLs. Conserved Trp⁵³⁶ juts into the CRY catalytic centre to mimic PL recognition of DNA photolesions. The FAD anionic semiquinone found in the crystals assumes a conformation to facilitate restructuring of the tail helix. These results help reconcile the diverse functions of the CRY/PL family by demonstrating how conserved protein architecture and photochemistry can be elaborated into a range of light-driven functions.

Keywords

Authors Abed E. Zubidat, Randy J. Nelson and Abraham Haim

Year 2011 Zubidat AE, Nelson RJ, Haim A

Report Name Spectral and duration sensitivity to light-at-night in 'blind' and sighted rodent species

Publication J Exp Biol

Issue-page numbers 214, 3206-3217. doi: 10.1242/jeb.058883

URL <http://jeb.biologists.org/content/214/19/3206.short>

Abstract Light-at-night (LAN) has become a defining feature of human and animal ecosystems and may possibly compromise human and animal physiology and health. Spectral and acclimation duration (AD) sensitivity were compared between social voles (*Microtus socialis*) and 'blind' mole rats (*Spalax ehrenbergi*) in four increasing ADs (0, 1, 7 and 21 days) to LAN (1×30 min, 293 μW cm⁻²) of three different monochromatic lights [blue (479 nm), yellow (586 nm) and red (697 nm)]. Animals were sampled for urine and oxygen consumption (VO₂) promptly after each LAN-AD. Urine samples were analyzed for production rate, urinary 6-sulfatoxymelatonin and urinary metabolites of adrenalin and cortisol. Overall, the blue light elicited the greatest effects on the biological markers of *M. socialis*, whereas similar effects were detected for *S. ehrenbergi* in response to red light. The increasing LAN-AD resulted in a dose-dependent decrement of all markers tested, except of stress hormones, which showed a direct positive correlation with LAN-AD. Our results suggest that: (1) photoperiod is an important cue for entraining physiological functions in the 'blind' *S. ehrenbergi*, which is essentially characterized by red-shifted sensitivity compared with the blue-shifted sensitivity detected for the sighted counterpart species, and (2) there is a strong association between LAN of the appropriate wavelength and adrenal endocrine responses, suggesting that LAN is a potential environmental stressor.

Keywords cosinor analysis, daily energy expenditure, daily rhythm, melatonin suppression, percentage change in body mass, retinal photoreceptor

Authors Zecheng Zuo, Hongtao Liu, Bin Liu, Xuanming Liu, Chentao Lin

Year 2011 Zuo Z, Liu H, Liu B, et al.

Report Name Blue Light-Dependent Interaction of CRY2 with SPA1 Regulates COP1 activity and Floral Initiation in Arabidopsis

Publication Current Biology

Issue-page numbers Volume 21, Issue 10, 24 May 2011, Pages 841-847

URL <http://www.sciencedirect.com/science/article/pii/S0960982211003526>

Abstract Cryptochromes are blue light receptors that mediate light regulation of gene expression in all major evolution lineages, but the molecular mechanism underlying cryptochrome signal transduction remains not fully understood [[1] and [2]]. It has been reported that cryptochromes suppress activity of the multifunctional E3 ubiquitin ligase CONSTITUTIVE PHOTOMORPHOGENIC 1 (COP1) to regulate gene expression in response to blue light [[3] and [4]]. But how plant cryptochromes mediate light suppression of COP1 activity remains unclear. We report here that Arabidopsis CRY2 (cryptochrome 2) undergoes blue light-dependent interaction with the COP1-interacting protein SUPPRESSOR OF PHYTOCHROME A 1 (SPA1) [[5] and [6]]. We demonstrate that SPA1 acts genetically downstream from CRY2 to mediate blue light suppression of the COP1-dependent proteolysis of the flowering-time regulator CONSTANS (CO) [[7] and [8]]. We further show that blue light-dependent CRY2-SPA1 interaction stimulates CRY2-COP1 interaction. These results reveal for the first time a wavelength-specific mechanism by which a cryptochrome photoreceptor mediates light regulation of protein degradation to modulate developmental timing in Arabidopsis.

Keywords