What happens at night just beyond our doorstep?

Nighttime is not necessarily bedtime, at least not for many animals. After all, many animals don't wake up until the sun goes down.

About two-thirds of the world's animal species are nocturnal, including about half of all insect species.[1] Nocturnal animals depend on darkness and natural light from the moon and stars for orientation, movement, breeding, hunting or foraging, and avoiding predators and food competitors.

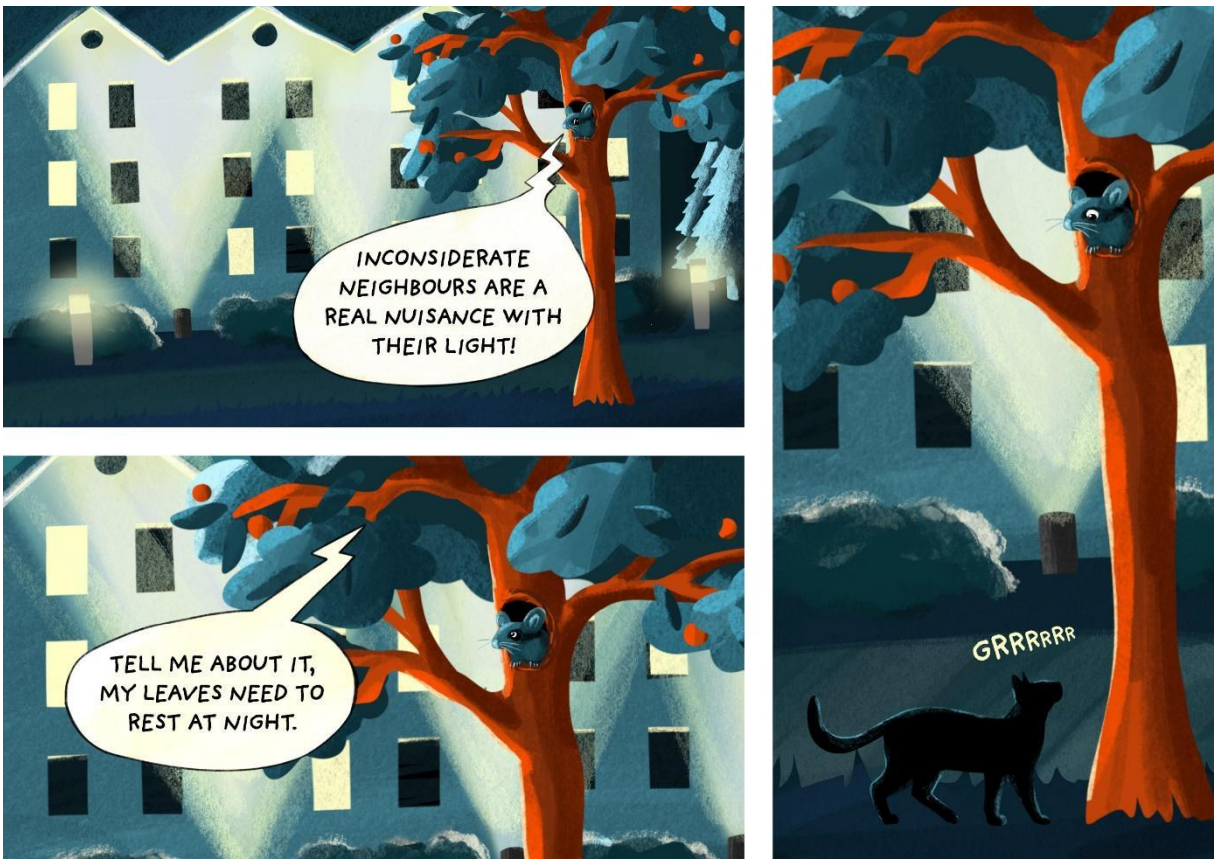
Artificial light at night affects physiological functions and processes, as well as animal behaviour: they may be unnaturally attracted to or repulsed by artificial light or lose their orientation.

1 Hölker F, Moss T, Griefahn B et al. (2010) The Dark Side of Light: A Transdisciplinary Research Agenda for Light. Ecol Soc 15(4):13.

content by: Stefanie Suchy, initiative "Plight with light"

translation: Project SKYSCAPE ITAT 2047, KP Interreg Italien-Österreich 2014-2020

Bothersome brightness: our secretive neighbours



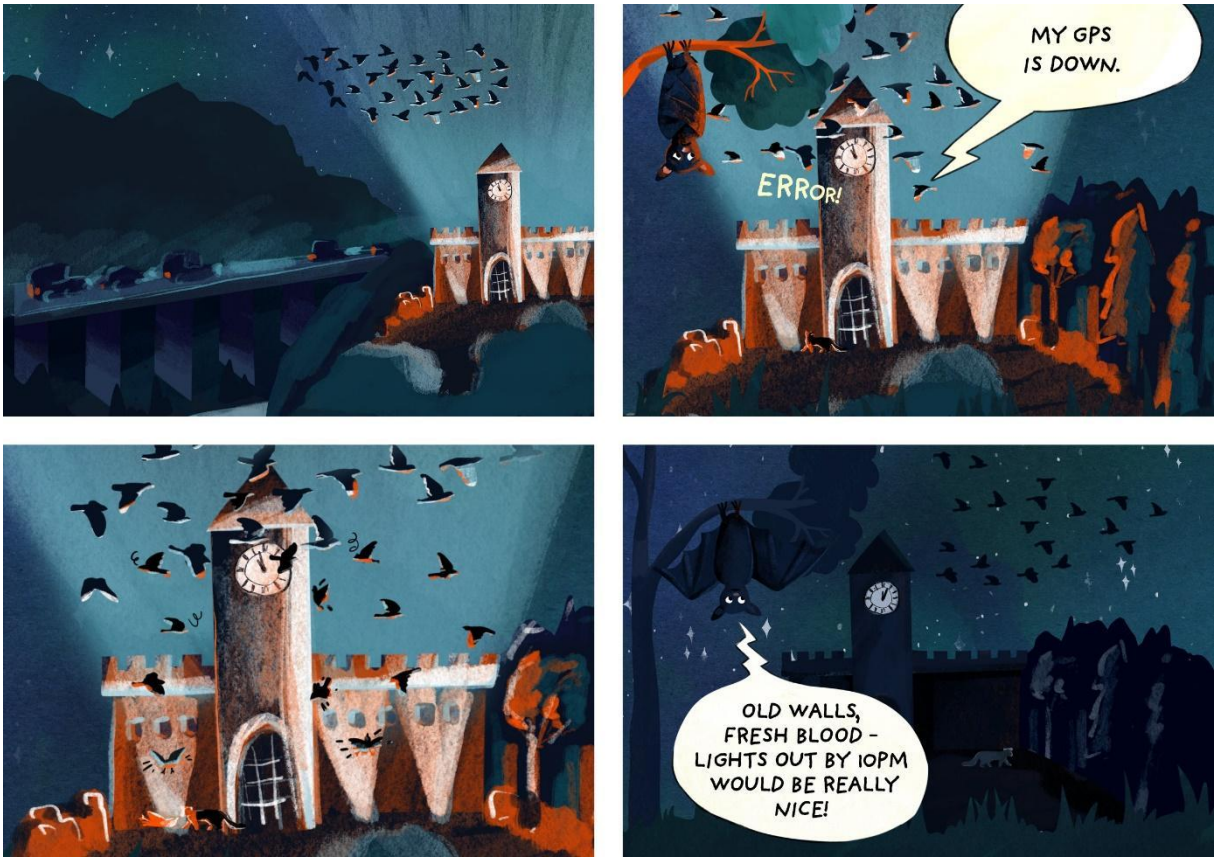
What happens at night just beyond our doorstep? (c) Amber Catford

More and more, people feel disturbed by their neighbour's excessive use of light. Luckily for people, they can at least discuss this problem and come to a solution. But if your neighbour is the secretive, endangered garden dormouse, you should be aware that this nocturnal rodent needs darkness to avoid predators and forage with its highly acute, well-adapted senses. The dormouse is an omnivore. It will even eat slugs if given the chance. In spite of their name, however, garden dormice prefer to live in the woods. Nocturnal artificial light reduces and fragments the habitat of mammals increasing the risk that they become easy prey. In fact, studies show that the brightness of the full moon (max. 0.3 lx) is already enough to reduce activity and food intake amongst many rodents.[1] Similarly, plants also regenerate at night and continuous exposure to light damages their ability to photosynthesise.[2]

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (eds.) Ecological Consequences of Artificial Night Lighting. Island Press.

2 Kwak MJ, Je SM, Cheng HC et al. (2018) Night Light-Adaptation Strategies for Photosynthetic Apparatus in Yellow-Poplar (Liriodendron tulipifera) Exposed to Artificial Night Lighting. Forests 9(2):74.

Bothersome brightness: bird migration



What happens at night just beyond our doorstep? (c) Amber Catford

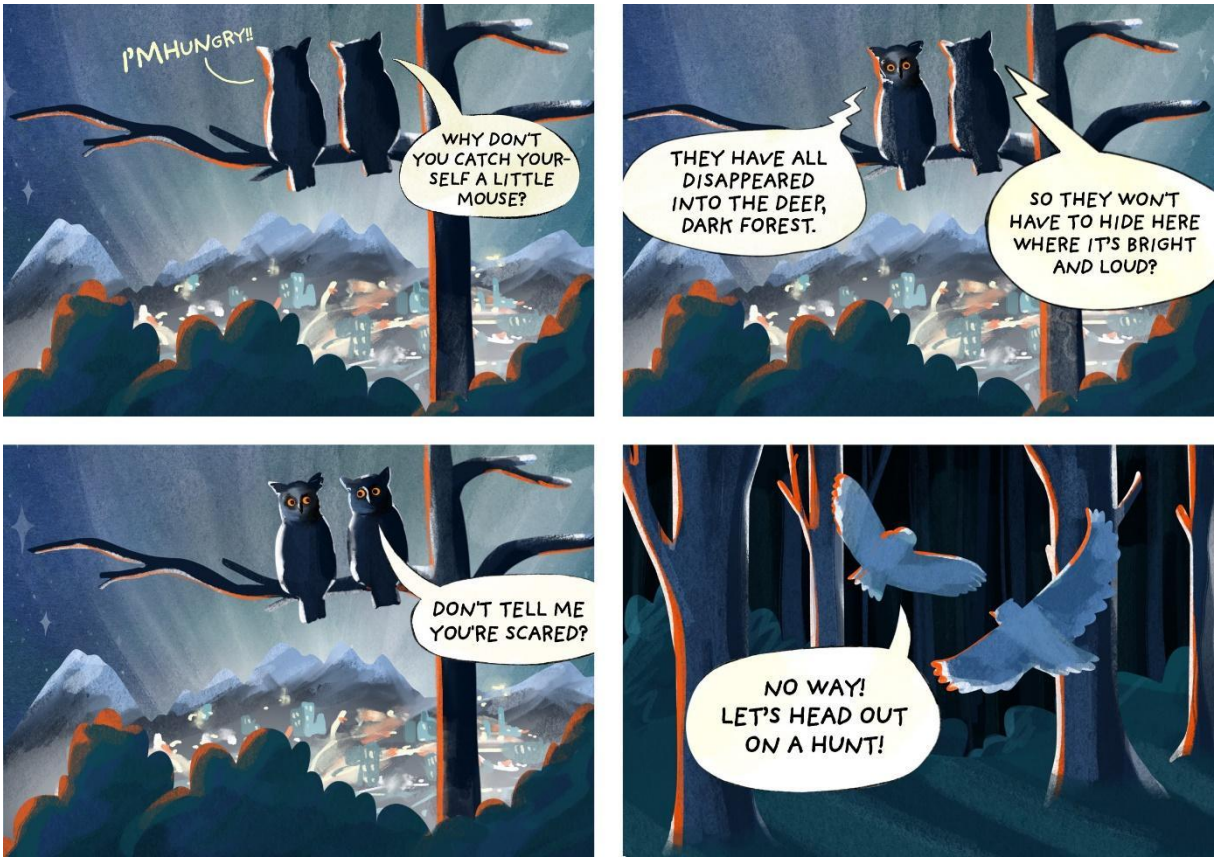
Most migratory birds migrate at night because they are exposed to less air turbulence and are better able to conserve energy. The main migration periods are from February to May and from August to November. Migratory birds (as well as migrating bats) are disturbed and may become confused or lose their orientation as a result of illuminated objects, searchlights and large-scale illuminated areas - sometimes with fatal results.[1, 2] At the edges of the Alps, at mountain crossings and in some valleys, bird migration becomes heavily concentrated, which is why the illumination of castles, mountain huts, summit crosses etc. should be avoided there. For animals in these areas, wind turbines can also be lethal. Around the new moon, illuminated buildings become even more attractive. Studies show that continuous lighting attracts and irritates more migratory birds than flashing light.[3] This insight is significant when it comes to warning lights for air traffic.

1 Haupt H, Schillemeit U (2011) Lichtanlagen bringen Zugvögel vom Kurs ab. Natur und Landschaft. 43(6):165-170.

2 Voigt CC, Roeleke M, Marggraf L et al. (2017) Migratory bats respond to artificial green light with positive phototaxis. PLoS ONE 12(5):e0177748.

3 Gauthreaux SA, Belser CG (2006) Effects of Artificial Night Lighting on Migrating Birds. In: Rich C, Longcore T (eds.): Ecological Consequences of Artificial Night Lighting. Island Press.

Bothersome brightness: predators and their prey



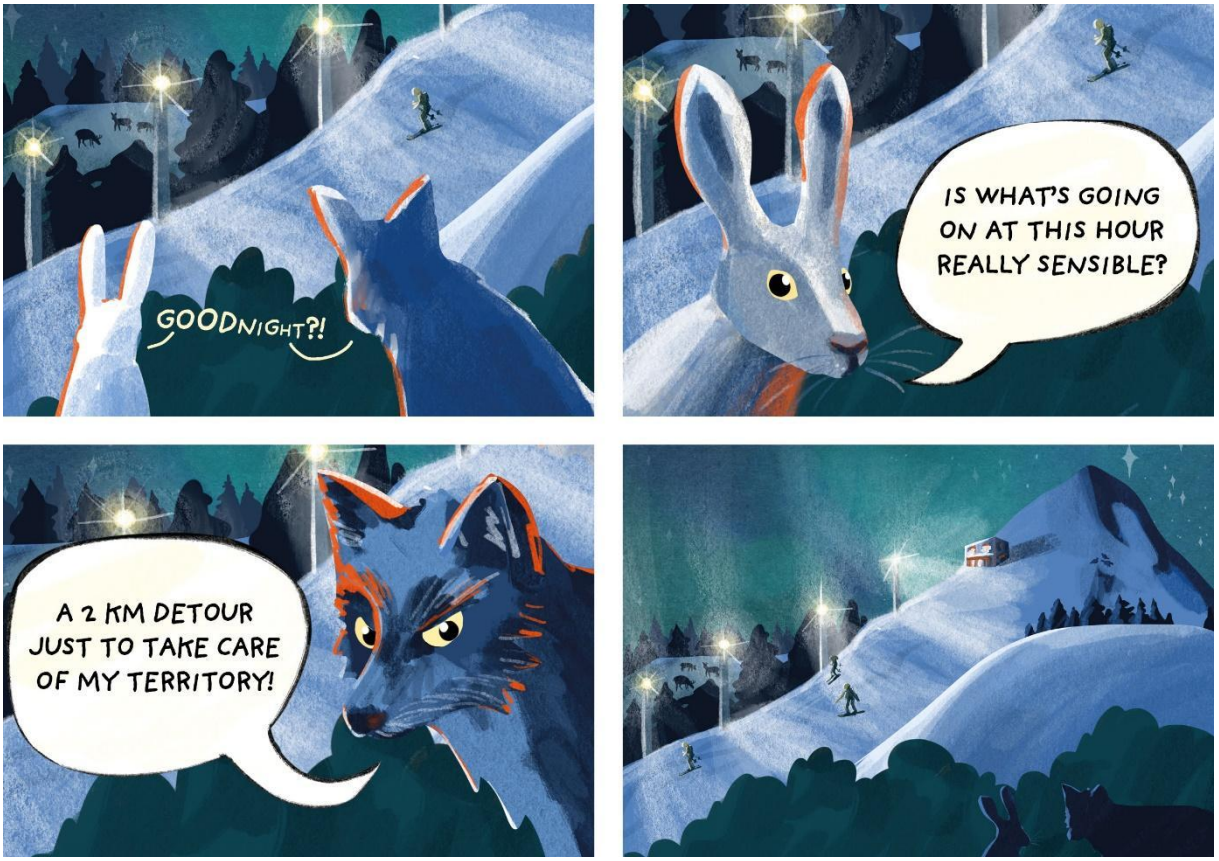
What happens at night just beyond our doorstep? (c) Amber Catford

The eagle owl is the largest owl in the world. It can turn its head up to 270°. The owl's most important sensory organ is the ears, which helps it locate and strike prey in total darkness. Nocturnal mammals avoid open areas under the light of the full moon (max. 0.3 lx). Limiting their activity at such times probably helps them to avoid being seen by potential predators.[1] In turn, eagle owls have been increasingly observed when the moon is full, covering longer distances and flying faster.[2] Such studies suggest that animals change their behaviour in accordance with the amount of available light. Light pollution from illuminated valleys and cities penetrates into natural areas and affects the habitat and the species that live there.

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (eds.): Ecological Consequences of Artificial Night Lighting. Island Press.

2 Penteriani V, Kuparinen A, Delgado MD et al. (2011) Individual status, foraging effort and need for conspicuousness shape behavioural responses of a predator to moon phases. Animal Behaviour 82, 413-420.

Bothersome brightness: the fox and the hare



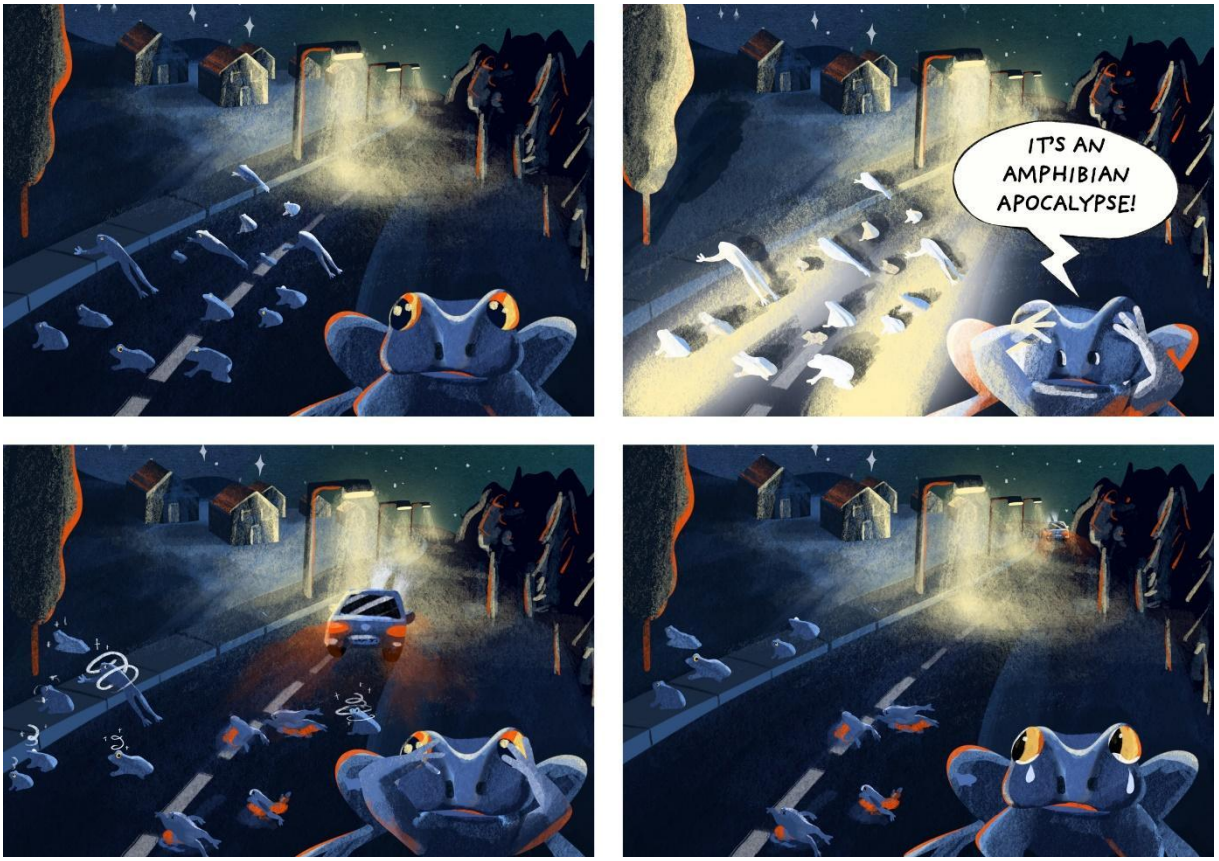
What happens at night just beyond our doorstep? (c) Amber Catford

Many sports facilities are located in natural surroundings and on the outskirts of settlements. Amongst the consequences of using sports facilities at night are the noise from operations and, in the case of ski slope lighting, even longer periods of disturbance caused by the delay in slope preparation time until late at night.[1] These conditions do not suit the mountain hare, as it is predominantly crepuscular and nocturnal. Mountain-dwelling animals also have other challenges to contend with, such as climate change, which is causing high altitude habitats to shift to higher elevations, thus creating a trap for mountain hare.[2] Red foxes that live near humans are predominantly nocturnal, which means that hares are likely to be on their menu. Many animals, including grouse and deer, have to manage their energy in winter due to lack of food. Disturbances caused, for example, by noise and light alter their metabolism, which in turn weakens the animals.

1 Kostenzer J (2013) Leuchtende Hänge, lange Schatten – Nachtschilauf in Tirol. In: Held M, Hölker F, Jessel B. Schutz der Nacht – Lichtverschmutzung, Biodiversität und Nachtlandschaft. BfN-Skripten 336. Bundesamt für Naturschutz (eds.).

2 Rehnus M (2013) Der Schneehase in den Alpen. Ein Überlebenskünstler mit ungewisser Zukunft. Bristol-Schriftenreihe: Vol 38.

Bothersome brightness: spring nights



What happens at night just beyond our doorstep? (c) Amber Catford

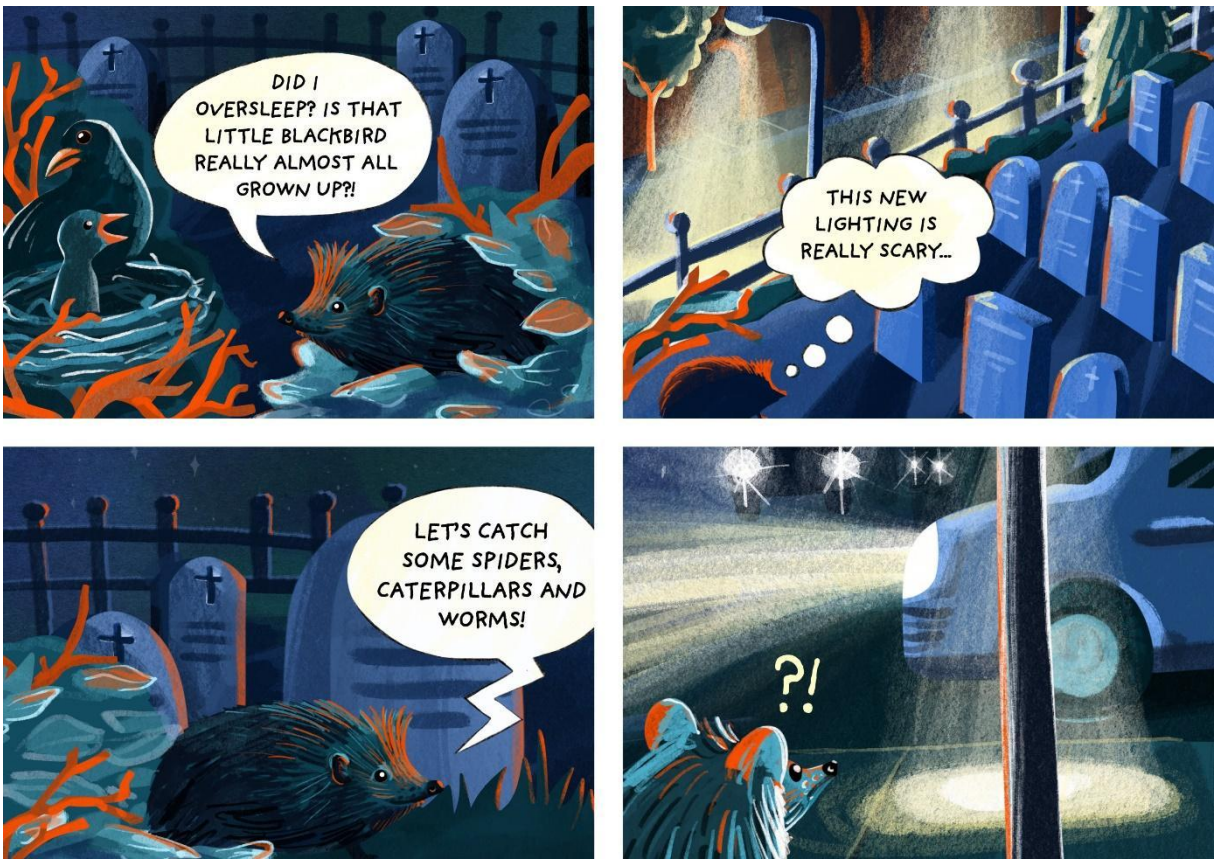
Most frog and toad species are partially or completely nocturnal and have keen eyesight. The common frog is even able to perceive colours in the dark.[1] Meanwhile, the common toad needs only a fraction of the light produced by the starry sky (0.00001 lx) to catch its prey at night.[2] To put this value into perspective: the maximum brightness of the full moon is 0.3 lx. Nocturnal amphibians are very sensitive to glare: becoming adjusted to darkness can take more than an hour, during which time important visual information is lacking.[2] Common toads move from their wintering grounds to spawning grounds in March or April. Such mass migrations are especially common between dusk and 10 pm. Common toads make use of dark passages and avoid street lighting.[3] Habitat loss and road traffic are major threats to these animals.

1 Kelber A, Yovanovich C, Olsson P (2017) Thresholds and noise limitations of colour vision in dim light. Phil Trans R Soc B 372:20160065.

2 Buchanan BW (2006) Observed and Potential Effects of Artificial Night Lighting on Anuran Amphibians. In: Rich C, Longcore T (eds.): Ecological Consequences of Artificial Night Lighting. Island Press.

3 van Grunsven RHA, Creemers R, Joosten K et al. (2017) Behaviour of migrating toads under artificial lights differs from other phases of their life cycle. Amphibia-Reptilia 38:49-55.

Bothersome brightness: rude awakening



What happens at night just beyond our doorstep? (c) Amber Catford

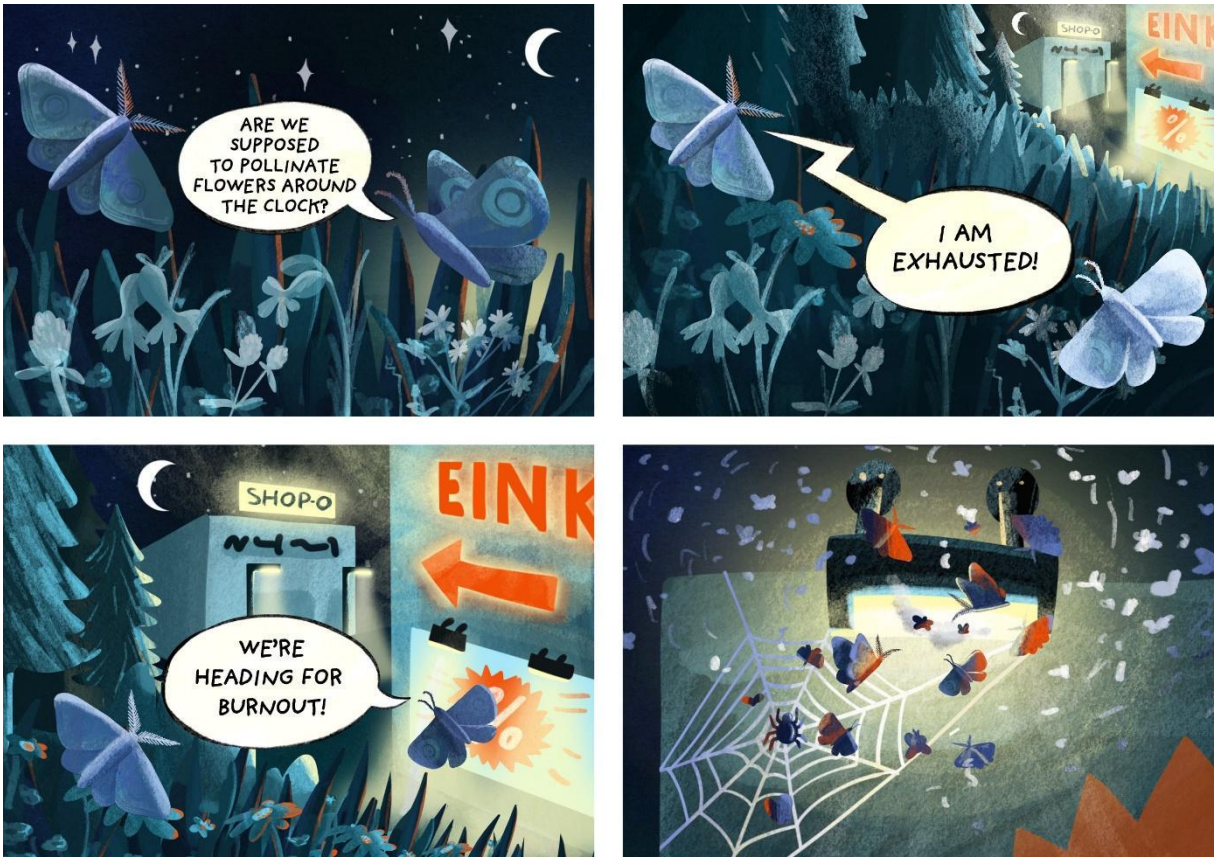
Good habitat for the crepuscular and nocturnal European hedgehog includes natural, toxin-free gardens, parks or cemeteries with hedges, piles of leaves and branches, and places to slip under fences. In April, the hedgehog awakens from hibernation. Under cover of darkness, this animal uses its extremely fine sense of smell to search for insects & co. Urban hedgehogs have been shown to avoid artificially illuminated areas.[1] Light pollution increases near building developments where habitats are fragmented and destroyed. Roads in residential areas are far too often a deadly trap for hedgehogs. In well-illuminated habitats, birds such as robins, blackbirds, great tits and blue tits start their morning songs earlier in the year. As a result, they also start breeding, foraging and developing earlier, which can have adverse effects on the life expectancy of the animals.[2] Under laboratory conditions, it was found that a steady night-time light intensity of 0.3 lx (full moon brightness) renders male blackbirds infertile over time.[3]

1 Schroer S, Weiß NS, Grubisic M et al. (2019) Analyse der Auswirkungen künstlichen Lichts auf die Biodiversität. Naturschutz und Biologische Vielfalt 168. Bundesamt für Naturschutz Bonn (ed.).

2 Da Silva A, Valcu M, Kempenaers B (2015) Light pollution alters the phenology of dawn and dusk singing in common European songbirds. Phil Trans R Soc B Biol Sci 370(1667):1-9.

3 Dominoni DM, Quetting M, Partecke J (2013) Long-term effects of chronic light pollution on seasonal functions of European blackbird (Turdus merula). PLoS One 8(12):1-9.

Bothersome brightness: industrious pollinators



What happens at night just beyond our doorstep? (c) Amber Catford

Moths, which are important plant pollinators, are predominately active at night. Many plants that rely on nocturnal pollinators are characterised by their tantalising fragrance and brilliant flower colours. Nocturnal artificial light has been shown to reduce pollination. As a result, fewer fruits and plant seeds are produced.[1] Light pollution and especially the attraction effect of artificial light plays a role in the comparatively substantial decline of moths.[2] Bridge spiders like to build webs on structures near bodies of water and benefit from the insects which are attracted.[3] Walnut orb-weaver spider, on the other hand, need natural darkness to build their webs.[4]

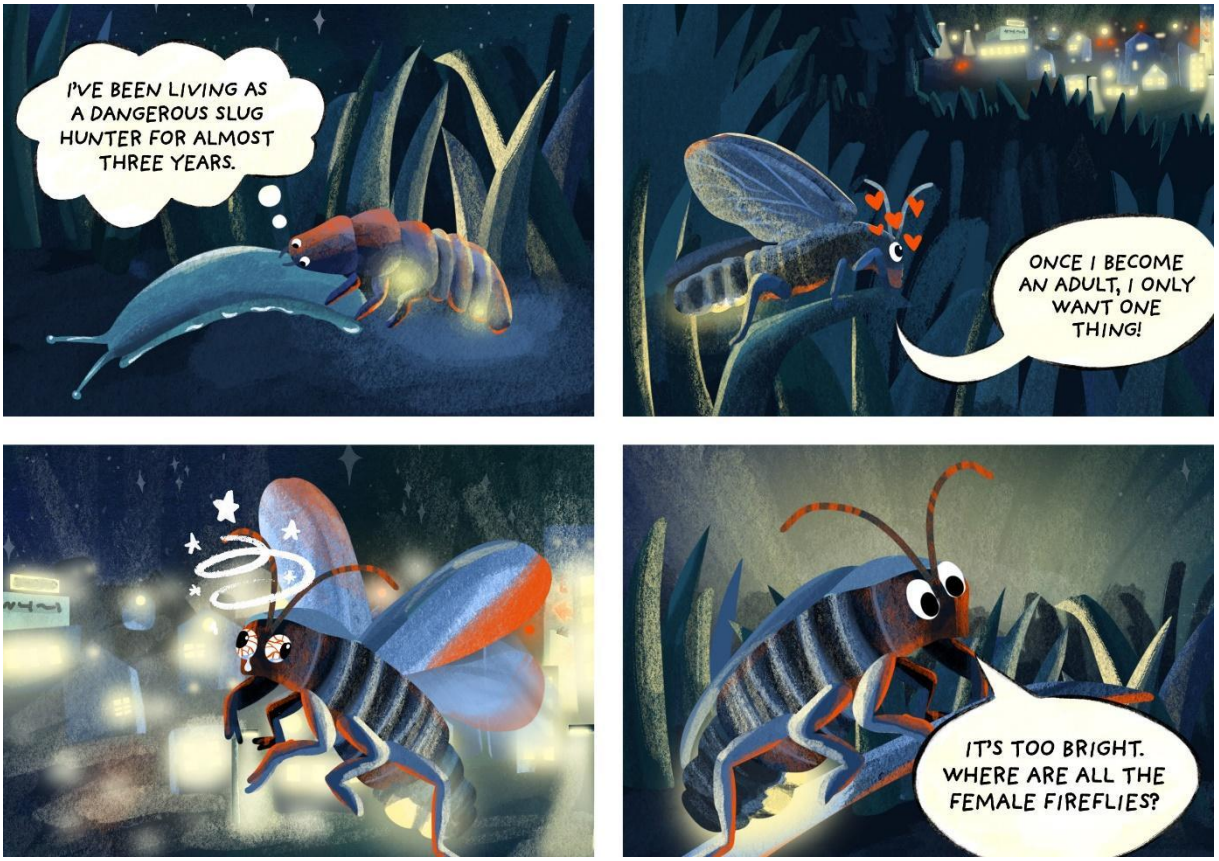
1 Knop E, Zoller L, Ryser R et al. (2017) Artificial light at night as a new threat to pollination. Nature 548:206-209.

2 van Langevelde F, Braamburg-Annegarn M, Huigens ME et al. (2017) Declines in moth populations stress the need for conserving dark nights. Global Change Biology 24:925-932.

3 Heiling AM (1999) Why do nocturnal orb-web spiders (Araneidae) search for light? Behav Ecol Sociobiol 46(1):43-49.

4 Zschokke S, Herberstein ME (2005) Laboratory methods for maintaining and studying web-building spiders. J Arachnol 33(2):205-213.

Bothersome brightness: unrequited love



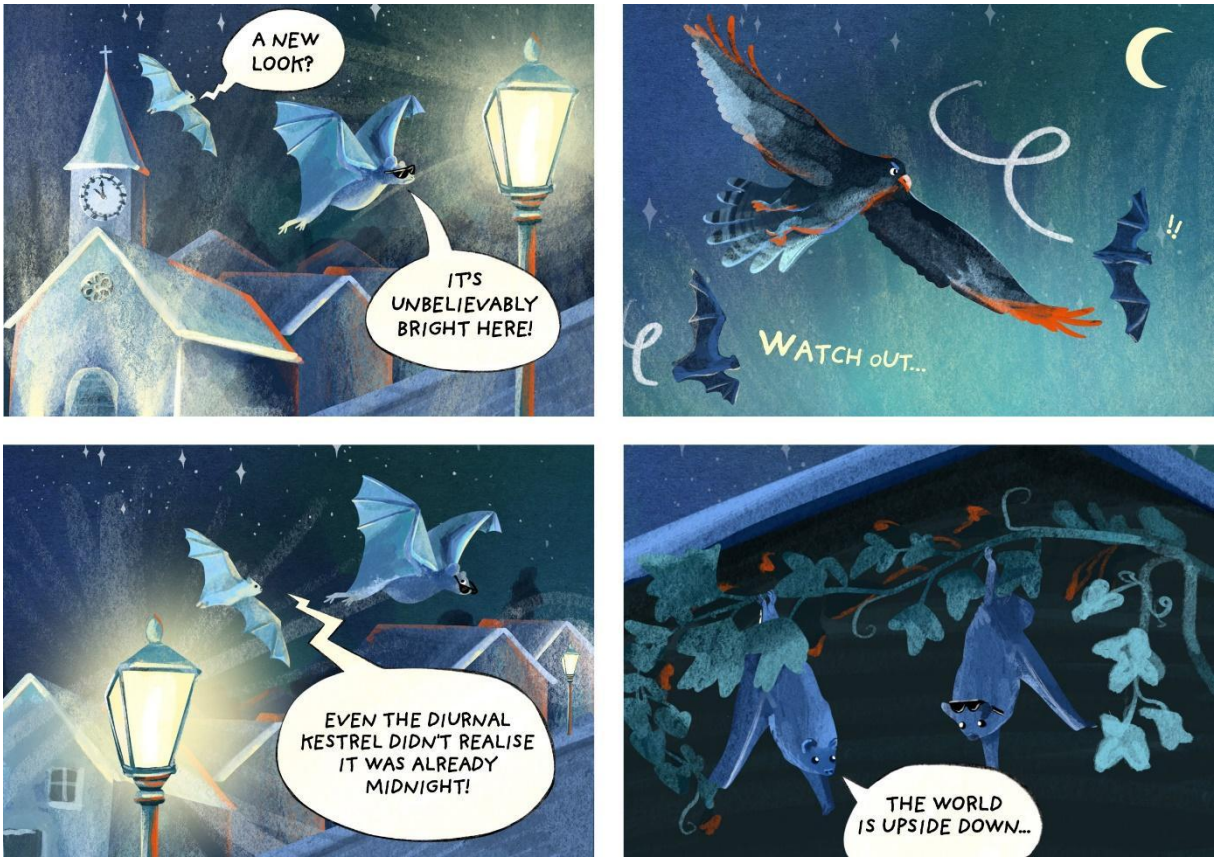
What happens at night just beyond our doorstep? (c) Amber Catford

The eggs, larvae, pupae, females (though they are not capable of flight) and males of the small firefly all glow. This special gift is called bioluminescence and it is used to ward off enemies and find mates. Glowing is a result of the luminescent substance luciferin, which is oxidised by the enzyme luciferase. Because artificial light restricts the range and efficacy of the light signals,[1, 2] the fireflies can be restricted from reproducing.

1 Ineichen S, Riesen M (2014) Kleine Lichter im lichten Wald : Leuchtkäfer leuchten nicht nur – sie stehen auch für eine gut strukturierte Landschaft mit hoher Biodiversität. Zürcher Wald. 2014(4):30-31.

2 www.gluehwuermchen.ch

Bothersome brightness: the nighttime is for bats



What happens at night just beyond our doorstep? (c) Amber Catford

Bats use echolocation to orientate themselves in the dark and to catch insects. Echolocation relies on emitting ultrasound and reading the echo. Bats also have light-sensitive eyes. Habitat fragmentation and reduction (e.g. the *lesser horseshoe bat*[1]), delayed departure times from roosting sites (e.g. *Geoffroy's bat*[2]) and the total abandonment of roosting sites (e.g. *brown long-eared bat*[3]) are just a few negative effects resulting from the use of artificial light at night. The common noctule, for instance, hunts insects attracted by artificial light. Meanwhile, the mouse-eared bat avoids illuminated areas altogether.[4] The lesser horseshoe bat has disappeared completely in some mountain valleys in Switzerland after street lighting was installed. At the same time, the less light-shy common pipistrelle has spread into these areas instead. The suspicion is that the lesser horseshoe bat disappeared due to competitive pressure. Both species are about the same size and eat the same spectrum of food.[5] It has also been observed that some diurnal birds use artificial light at night to their advantage.[6]

1 Stone EL, Jones G, Harris S (2012) Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global Change Biology 18, 2458-2465.

2 Boldogh S, Dobrosi D, Samu P (2007) The effects of the illumination of buildings on house-dwelling bats and its conservation consequences. Acta Chiropterologica 9, 527-534.

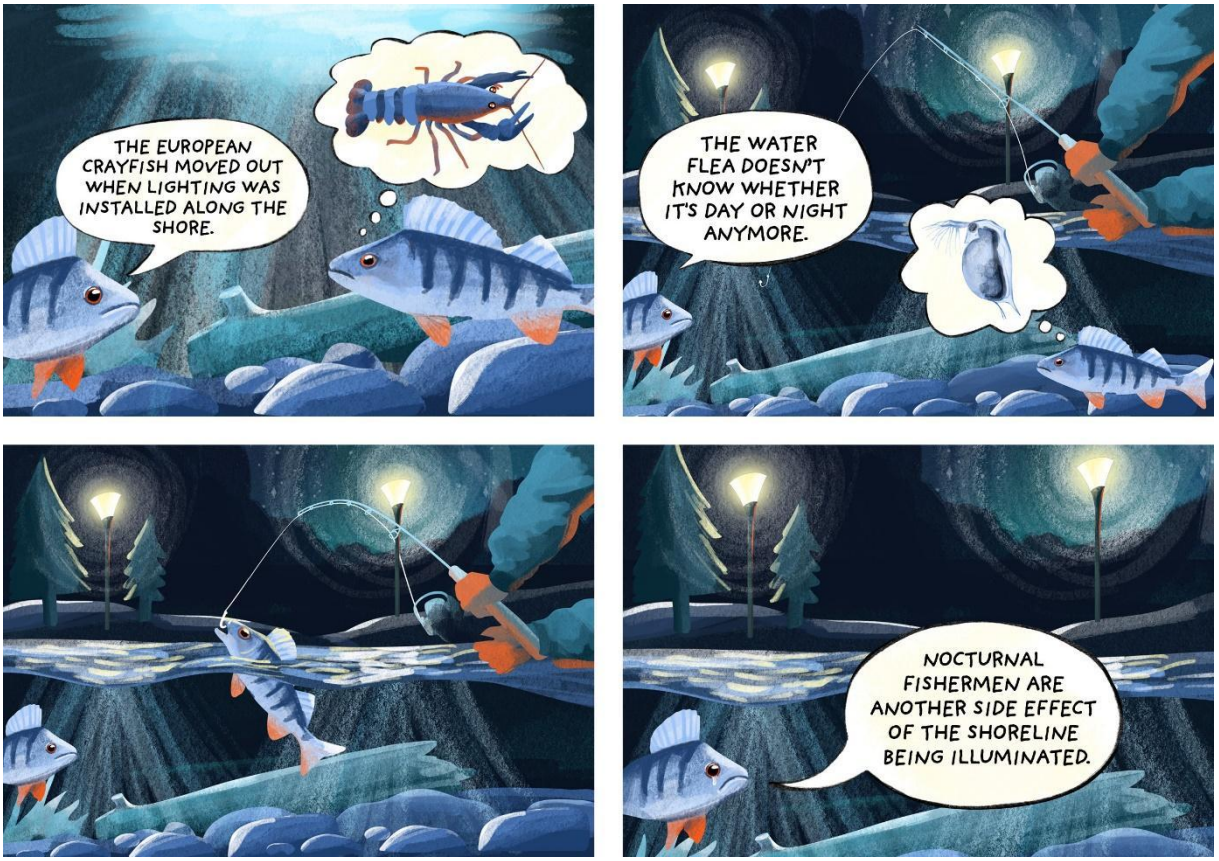
3 Rydell J, Eklöf J, Sánchez-Navarro S (2017) Age of enlightenment: long-term effects of outdoor aesthetic lights on bats in churches. Open Science 4, 161077.

4 Rydell J (2006) Bats and Their Insect Prey at Streetlights. In: Rich C, Longcore T (eds.): Ecological Consequences of Artificial Night Lighting. Island Press.

5 Arlettaz R, Godat S, Meyer H (2000) Competition for food by expanding pipistrelle bat populations (Pipistrellus pipistrellus) might contribute to the decline of lesser horseshoe bats (Rhinolophus hipposideros). Biological Conservation 93:55-60.

6 Baumgart W (2006) Greifvögel und Eulen als Fledermaus-Jäger. Ornithol Mitt 58:292-309.

Bothersome brightness: nighttime beneath the surface



What happens at night just beyond our doorstep? (c) Amber Catford

Some fish are active at night, including the perch, which likes to hunt at dusk. Under laboratory conditions, it was discovered that a light intensity of 1 lx at night could already suppress melatonin production in European perch.[1] Hence, humans are not the only ones to experience the phenomenon of inhibited melatonin synthesis caused by artificial light at night. While this hormone is important for our regeneration, for example, its far-reaching effects on many organisms are unknown. The European crayfish is another nocturnal aquatic animal. Crayfish shed their skin mainly during dark phases of the moon. The assumption is that they protect themselves from predators with this adaptation.[2] A study in the Canton of Zurich compared the occurrence of native crayfish with existing nocturnal brightness levels. No individuals occurred in potentially suitable habitats with steady brightness levels of over 0.75 lx. Other factors, such as a lack of structure and poor water quality, also threatened the animals at these sites.[3] Under cover of the night, small life forms such as water fleas swim towards the water surface and feed on algae there. Even the levels of brightness caused by urban light pollution were enough to suppress its nightly ascent. This can disrupt the aquatic food chain and lead to more frequent algal bloom.[4]

1 Brüning A, Hölker F, Franke S et al. (2015) Spotlight on fish: light pollution affects circadian rhythms of European perch but does not cause stress. Sci Total Environ 511:516–522

2 Franke R, Hoerstgen-Schwark G (2013) Lunar-Rhythmic Molting in Laboratory Populations of the Noble Crayfish Astacus astacus (Crustacea, Astacidea): An Experimental Analysis. PLoS ONE 8(7):e68653.

3 Schuler LD, Schatz R, Berweger CD (2018) From global radiance to an increased local political awareness of light pollution. Environmental science & policy 89:142-152.

4 Moore M, Pierce SM, Walsh HM et al. (2000) Urban light pollution alters the diel vertical migration of Daphnia. Verh Internat Verein Limnol 27(1-4):779-782.

Che cosa succede di notte oltre la porta di casa?

Di notte non necessariamente tutti gli animali dormono, alcuni si svegliano proprio quando tramonta il sole. Circa due terzi delle specie animali del pianeta sono notturne, tra cui circa la metà di tutte le specie di insetti.[1]

Gli animali notturni dipendono dall'oscurità e dalla luce naturale della luna e dalle stelle per orientarsi, muoversi, riprodursi, cacciare o cercare cibo ed evitare in maniera efficace predatori e concorrenti nella catena alimentare.

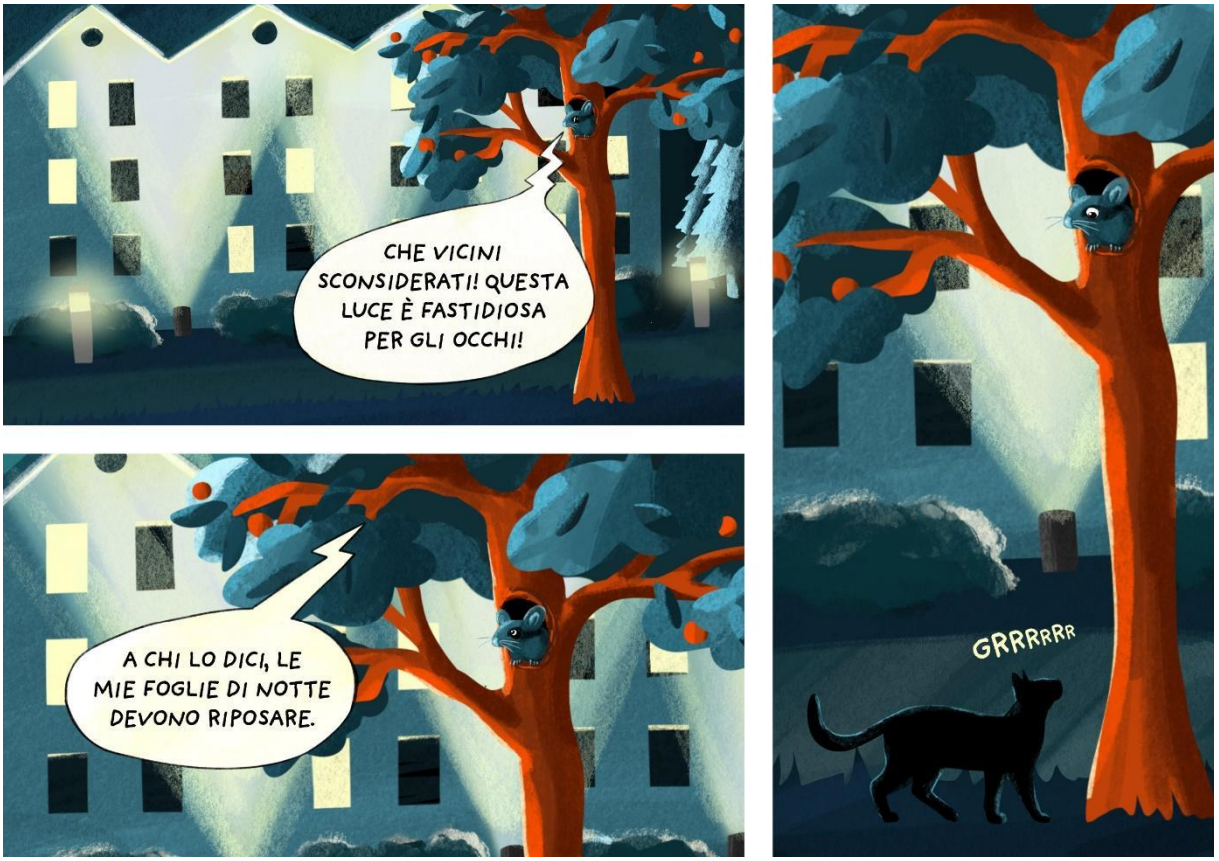
La luce artificiale notturna ha effetto sulle funzioni, i processi vitali e il comportamento degli animali. Tale influenza si esprime, per esempio, attirando o allontanando gli animali, o provocando una perdita di orientamento.

1 Hölker F, Moss T, Griefahn B et al. (2010) The Dark Side of Light: A Transdisciplinary Research Agenda for Light. Ecol Soc 15(4):13.

contenuti: Stefanie Suchy, initiative "Plightwithlight", Tiroler Umweltanwaltschaft

traduzione: Project SKYSCAPE ITAT 2047, KP Interreg Italien-Österreich 2014-2020

In chiara difficoltà: vicini discreti



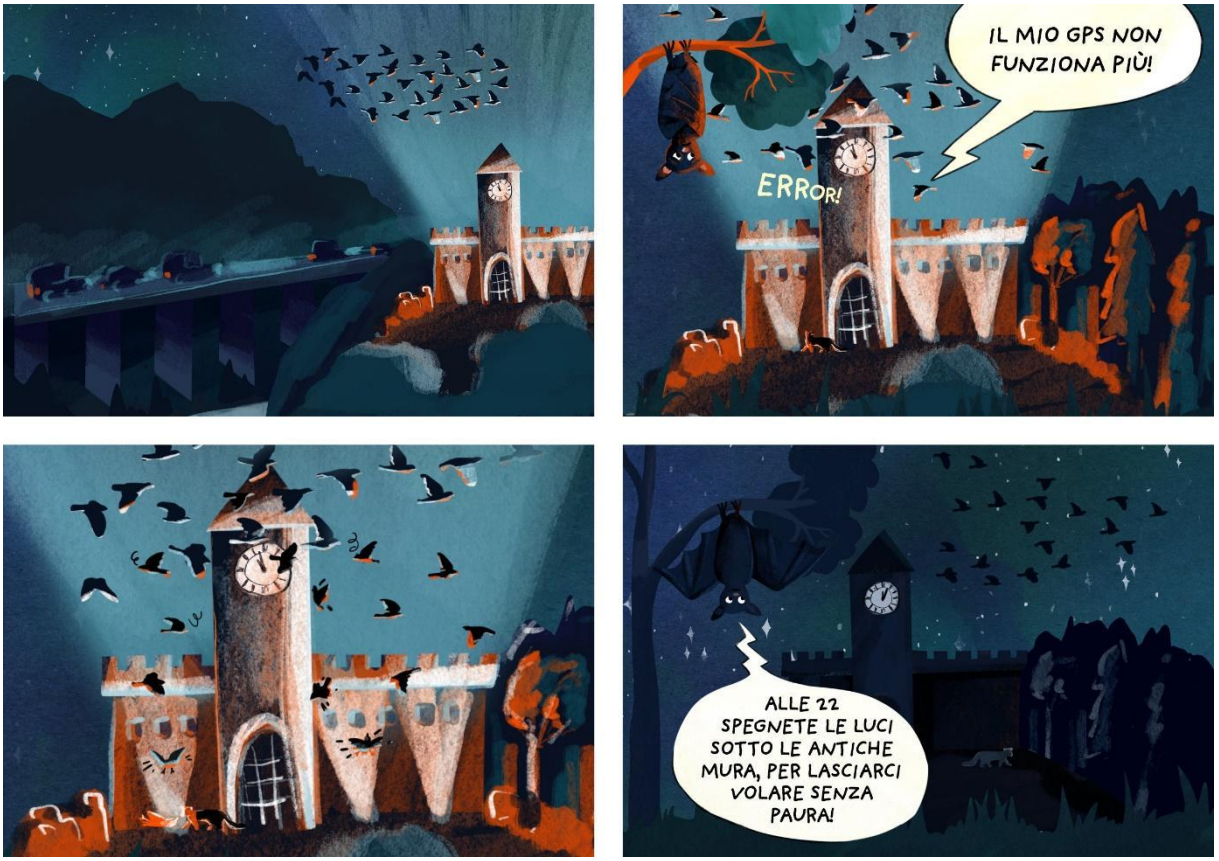
Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Sono sempre più numerose le persone che si sentono disturbate dall'eccessivo utilizzo della luce da parte dei propri vicini. Gli esseri umani possono almeno comunicare tra loro e trovare una soluzione. Se come vicino di casa si ha invece un animale in via di estinzione come il timido topo quercino, è bene sapere che si tratta di un roditore notturno per il quale l'oscurità è molto importante poiché gli consente di evitare i predatori e di procurarsi il cibo utilizzando i suoi sviluppatissimi sensi. Questo animale dormiglione è onnivoro e non disdegna nemmeno le lumache. Al topo quercino, come suggerisce il nome, piace anche vivere nei boschi. Un'eccessiva illuminazione artificiale notturna riduce l'habitat dei mammiferi rendendoli facilmente individuabili dai predatori. Anche la flebile luminosità della luna piena (max 0,3 lx) è sufficiente a ridurre l'attività e l'assunzione di cibo di molti roditori.[1] La costante presenza di luce influisce inoltre sul processo di fotosintesi delle piante, che sfruttano la notte per rigenerarsi.[2]

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (Hg) Ecological Consequences of Artificial Night Lighting. Island Press.

2 Kwak MJ, Je SM, Cheng HC et al. (2018) Night Light-Adaptation Strategies for Photosynthetic Apparatus in Yellow-Poplar (Liriodendron tulipifera) Exposed to Artificial Night Lighting. Forests 9(2):74.

In chiara difficoltà: la migrazione degli uccelli



Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

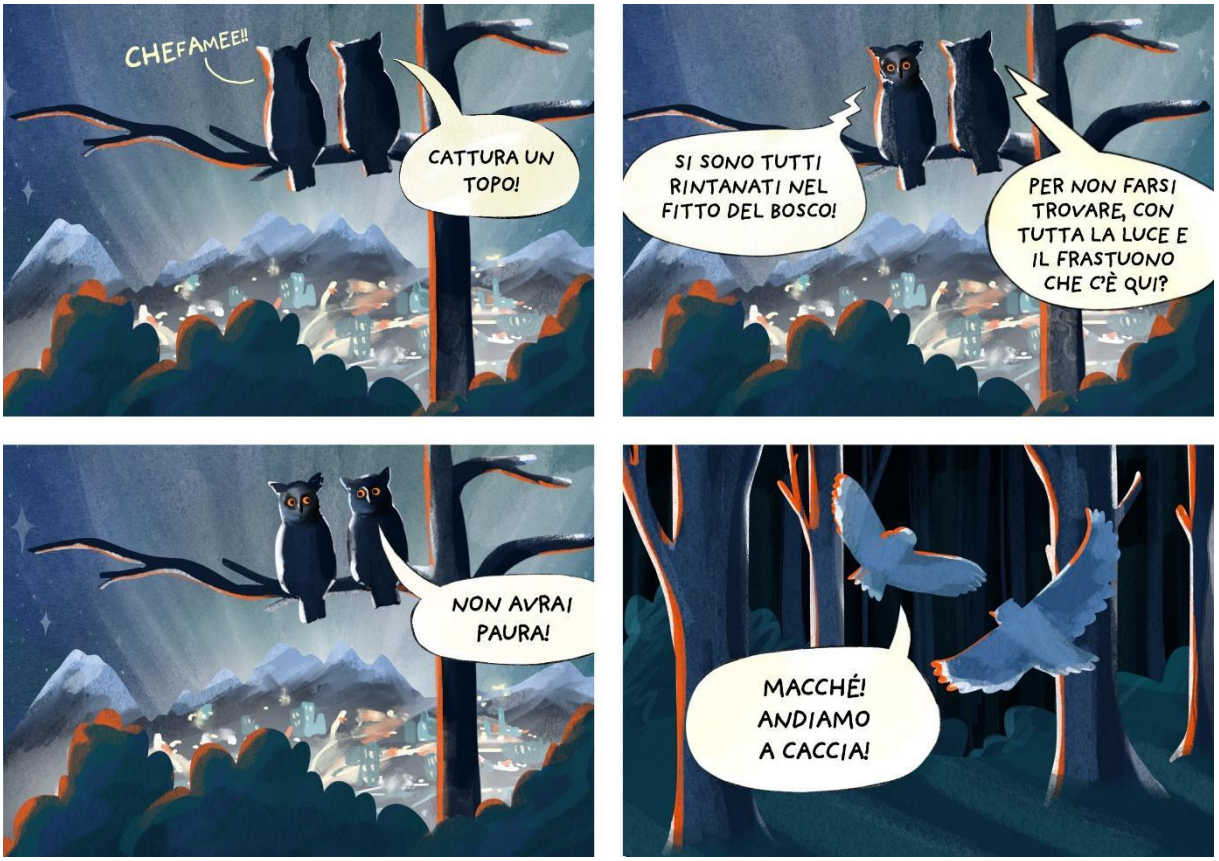
I principali periodi di migrazione vanno da febbraio a maggio e da agosto a novembre: in questi periodi la maggior parte degli uccelli migratori viaggia di notte per risparmiare energia ed essere meno esposti alle turbolenze. Gli oggetti luminosi, i fari e le grandi aree illuminate disturbano e riducono la capacità di orientamento degli uccelli migratori e dei pipistrelli, provocando a volte conseguenze fatali.[1, 2] Le migrazioni degli uccelli possono concentrarsi in corrispondenza dell'arco alpino, dei valichi montani e in alcune valli, perciò in questi luoghi si dovrebbe evitare l'illuminazione dei castelli, dei rifugi di montagna, delle croci di vetta, ecc. Anche le pale eoliche sono una trappola mortale per gli animali di queste zone, specialmente con il novilunio, quando la luce ininterrotta delle pale eoliche attrae gli uccelli migratori ancora di più della luce intermittente delle segnalazioni per il traffico aereo. [3]

1 Haupt H, Schillemeit U (2011) Lichtanlagen bringen Zugvögel vom Kurs ab. Natur und Landschaft. 43(6):165-170.

2 Voigt CC, Roeleke M, Marggraf L et al. (2017) Migratory bats respond to artificial green light with positive phototaxis. PLoS ONE 12(5):e0177748.

3 Gauthreaux SA, Belser CG (2006) Effects of Artificial Night Lighting on Migrating Birds. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

In chiara difficoltà: predatori e prede



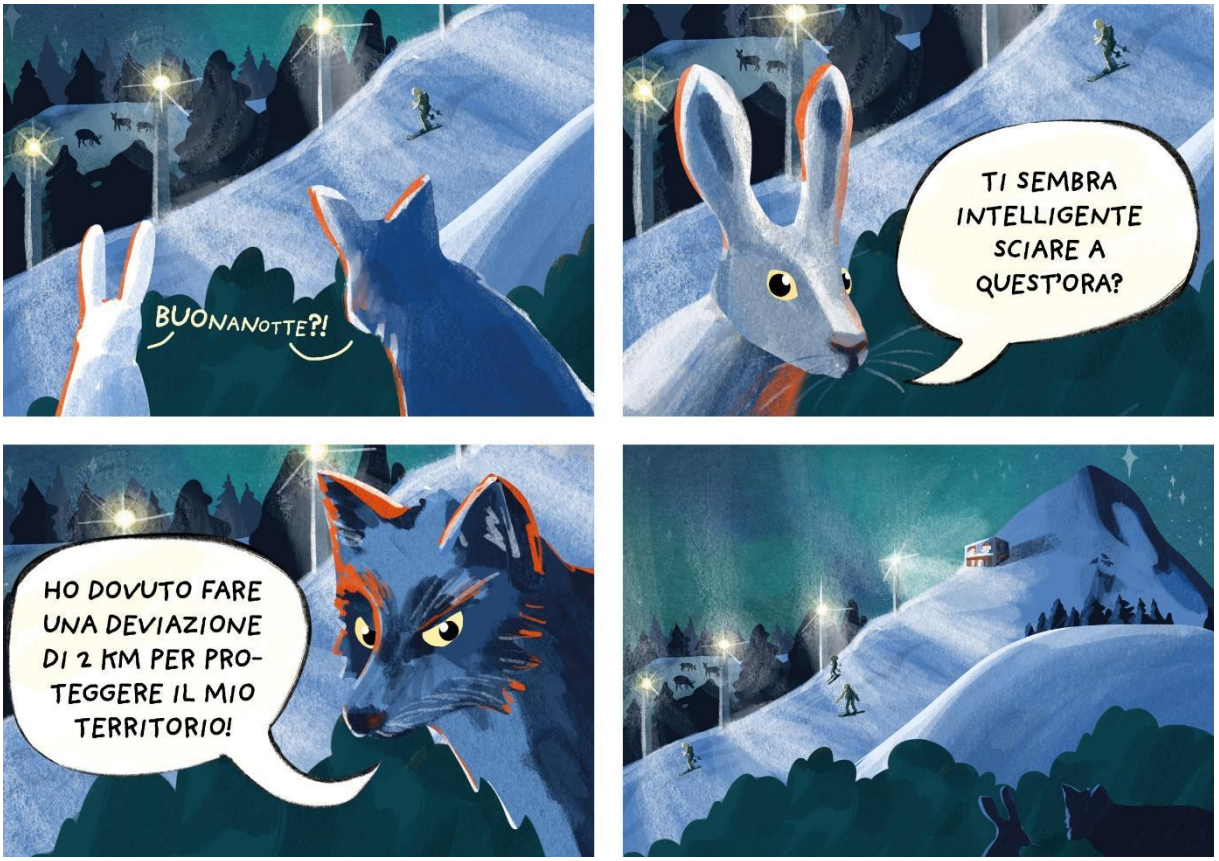
Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Il gufo reale è il gufo più grande del mondo. Questi uccelli possono ruotare la testa di 270° e le loro orecchie sono l'organo di senso più importante, infatti i gufi, con il solo aiuto dell'udito, riescono a localizzare le prede per poi catturarle. Con la luna piena (max. 0,3 lx), i mammiferi notturni evitano i grandi spazi aperti limitando anche le loro attività, probabilmente per non essere avvistati da potenziali predatori.[1] Questo fenomeno invece non è stato osservato nei gufi reali che, durante il plenilunio, sono più attivi e riescono a coprire distanze maggiori, mantenendo una velocità più elevata.[2] L'inquinamento luminoso proveniente da valli e città penetra nelle aree naturali, influenzando le specie e i loro habitat. Alcuni studi evidenziano come, anche in presenza di livelli di illuminazione molto bassi, gli animali modifichino il loro comportamento.

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

2 Penteriani V, Kuparinen A, Delgado MD et al. (2011) Individual status, foraging effort and need for conspicuousness shape behavioural responses of a predator to moon phases. Animal Behaviour 82, 413-420.

In chiara difficoltà: la volpe e la lepre



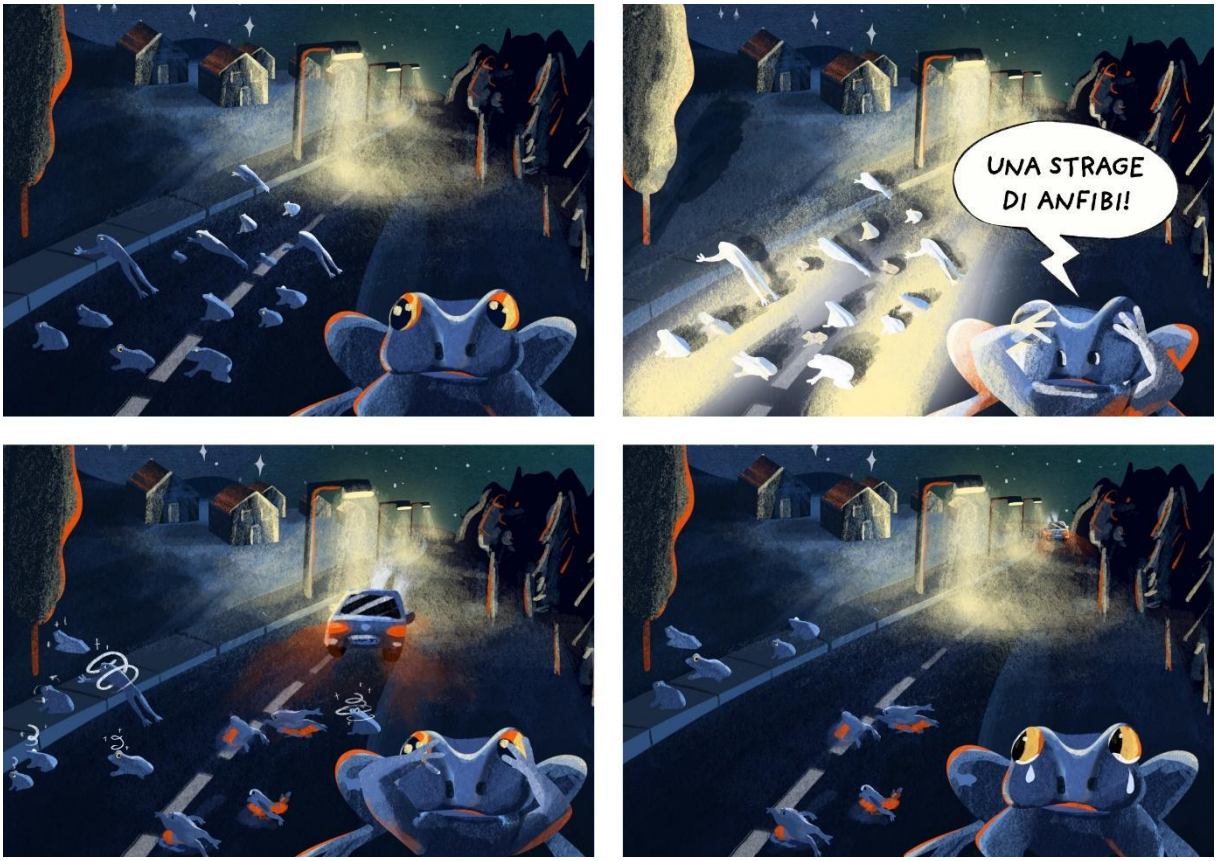
Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Molti impianti sportivi sorgono in ambienti naturali o ai margini di insediamenti. Tra le conseguenze più nocive dell'utilizzo notturno degli impianti sportivi è il rumore causato dai macchinari e, nel caso dell'illuminazione delle piste da sci, il trambusto prolungato dovuto al posticipo fino a tarda notte dei tempi di preparazione delle piste.[1] Questo disturba molto la lepre alpina, che è attiva principalmente al crepuscolo e di notte. Gli animali che vivono in alta montagna hanno anche altre sfide da affrontare: il cambiamento climatico infatti sta provocando un innalzamento dei piani altitudinali, una vera trappola per la lepre alpina.[2] Nei pressi degli insediamenti umani, le volpi rosse sono animali essenzialmente notturni e le lepri rientrano tranquillamente nel loro menù. Molti animali, compresi galli cedroni e cervi, devono gestire sapientemente la propria energia durante l'inverno per poter affrontare la mancanza di cibo. Il disturbo provocato, ad esempio, dai rumori e dalla luce aumenta il loro metabolismo e li rende più deboli.

1 Kostenzer J (2013) Leuchtende Hänge, lange Schatten – Nachtschilauf in Tirol. In: Held M, Hölker F, Jessel B. Schutz der Nacht – Lichtverschmutzung, Biodiversität und Nachtlandschaft. BfN-Skripten 336. Bundesamt für Naturschutz (Hg).

2 Rehnus M (2013) Der Schneehase in den Alpen. Ein Überlebenskünstler mit ungewisser Zukunft. Bristol-Schriftenreihe: Vol 38.

In chiara difficoltà: le notti di primavera



Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

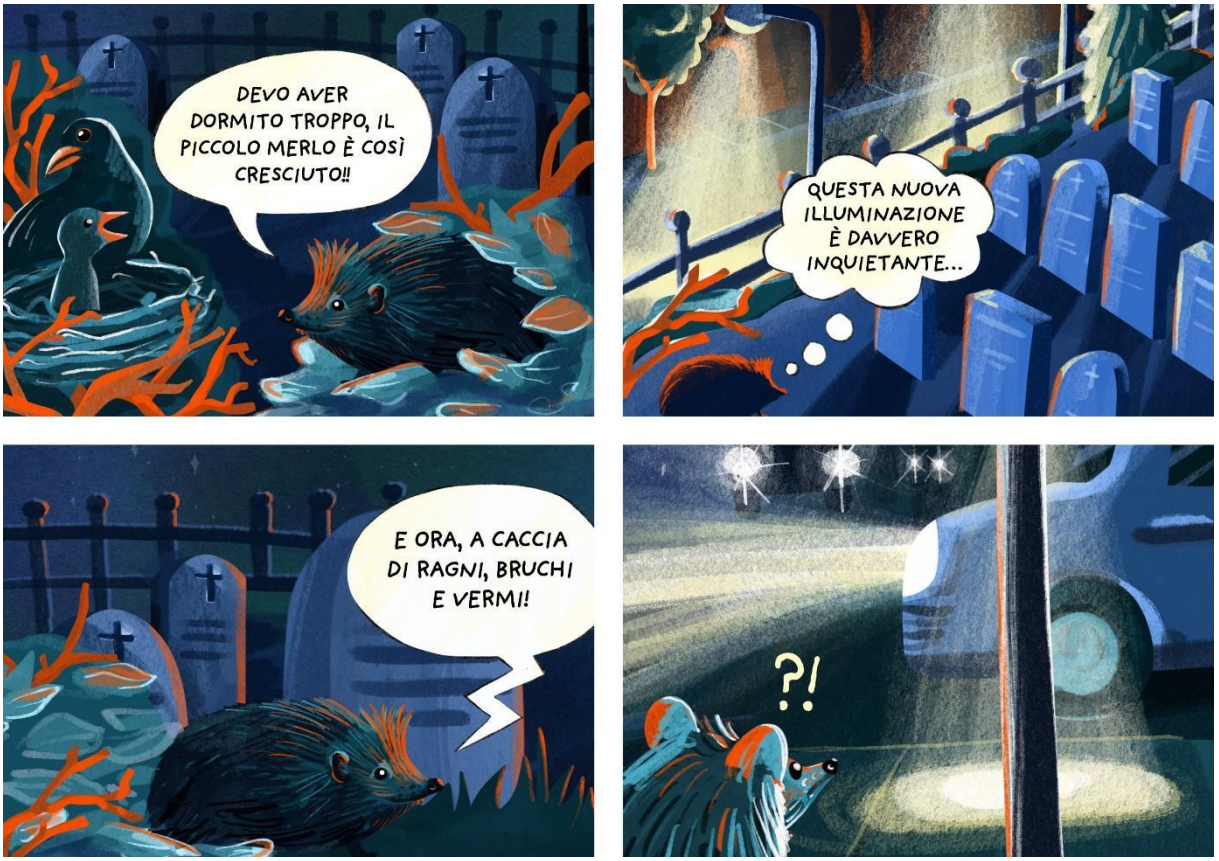
Quasi tutte le specie di rane e rospi hanno una vista molto sviluppata e svolgono le proprie attività parzialmente o completamente di notte. La rana temporaria, nota anche come rana rossa, è in grado persino di percepire i colori al buio,[1] mentre al rospo comune basta una parte minuscola della luce proveniente dal cielo stellato (0,00001 lx) per cacciare di notte [2]: per dare un'idea di questo valore basti pensare che la luna piena raggiunge una luminosità massima di 0,3 lx. Gli anfibi notturni hanno un'elevata sensibilità alla luce e, una volta abbagliati, riadattarsi al buio può richiedere loro più di un'ora, tempo nel quale non riescono ad acquisire importanti informazioni visive.[2] I rospi comuni migrano dai loro rifugi invernali verso le acque di riproduzione a marzo o ad aprile, sfruttando passaggi bui ed evitando attentamente le luci dei lampioni. [3] In questi mesi, specialmente tra il tramonto e le 22:00, si osservano veri e propri spostamenti di massa e la distruzione degli habitat come il traffico stradale rappresentano un grande pericolo per gli animali.

1 Kelber A, Yovanovich C, Olsson P (2017) Thresholds and noise limitations of colour vision in dim light. Phil Trans R Soc B 372:20160065.

2 Buchanan BW (2006) Observed and Potential Effects of Artificial Night Lighting on Anuran Amphibians. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

3 van Grunsven RHA, Creemers R, Joosten K et al. (2017) Behaviour of migrating toads under artificial lights differs from other phases of their life cycle. Amphibia-Reptilia 38:49-55.

In chiara difficoltà: che risveglio!



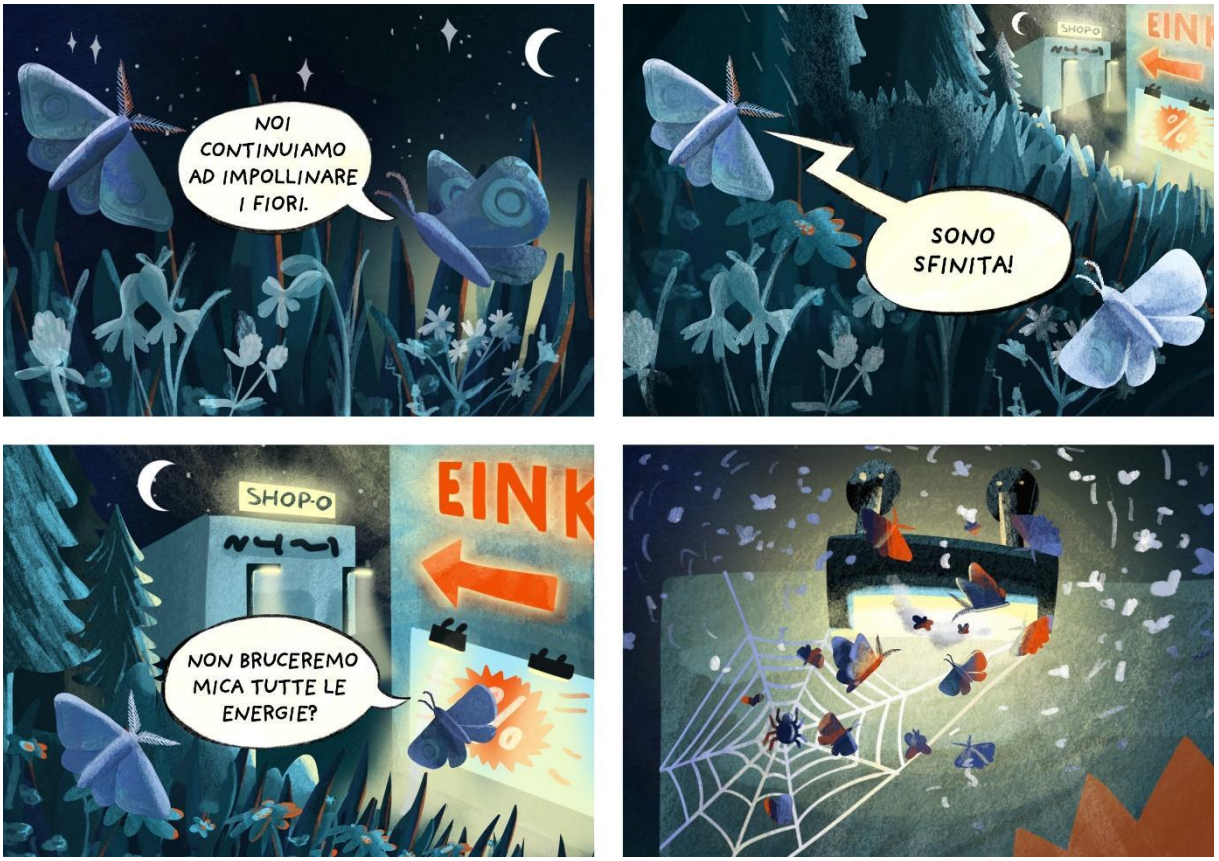
Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Giardini naturali privi di sostanze chimiche, parchi o cimiteri con siepi, opportunità di intrufolarsi sotto le recinzioni e mucchi di foglie e rami costituiscono un habitat ideale per il riccio comune, attivo al crepuscolo e di notte. Ad aprile il riccio si sveglia dal letargo. Con il favore dell'oscurità, questi animali vanno alla ricerca di insetti e altre fonti di cibo. È stato dimostrato che i ricci che vivono in aree urbane evitano le zone illuminate artificialmente.[1] L'inquinamento luminoso aumenta proporzionalmente al numero degli edifici e provoca la frammentazione e la distruzione del loro habitat. Le strade delle aree residenziali si trasformano troppo spesso in una trappola mortale per questi piccoli animali. Negli habitat illuminati pettirossi, merli, cinciallegre e cinciarelle iniziano con il loro cinguettio mattutino prematuramente nell'anno. Ciò comporta nidiate, ricerca di cibo e sviluppo anticipati, con un possibile effetto negativo sulla salute e sull'aspettativa di vita degli animali.[2] In condizioni di laboratorio è stato riscontrato che un'intensità luminosa notturna costantemente pari 0,3 lx (la luminosità della luna piena) provoca sterilità a lungo termine nei merli maschi.[3]

1 Schroer S, Weiß NS, Grubisic M et al. (2019) Analyse der Auswirkungen künstlichen Lichts auf die Biodiversität. Naturschutz und Biologische Vielfalt 168. Bundesamt für Naturschutz Bonn (Hg).
2 Da Silva A, Valcu M, Kempenaers B (2015) Light pollution alters the phenology of dawn and dusk singing in common European songbirds. Phil Trans R Soc B Biol Sci 370(1667):1-9.

3 Dominoni DM, Quetting M, Partecke J (2013) Long-term effects of chronic light pollution on seasonal functions of European blackbird (Turdus merula). PLoS One 8(12):1-9.

In chiara difficoltà: impollinatori laboriosi



Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

La maggior parte delle farfalle come le falene è attiva di notte e viene considerata un importante impollinatore. Molte piante che si affidano agli impollinatori notturni emanano un profumo seducente e producono fiori dal colore brillante. È stato dimostrato che la luce artificiale notturna riduce la capacità d'impollinazione di questi insetti, limitando la fecondazione dei semi di frutti o piante.[1] L'inquinamento luminoso ed in particolare l'attrazione esercitata dalla luce artificiale sono responsabili del declino relativamente massiccio del numero di falene.[2] Ai ragni della specie *Larinioides sclopetariusbauen* piace costruire ragnatele su strutture vicine all'acqua approfittandosi degli insetti che vengono attratti.[3] Il *Nuctenea umbratica*, invece, ha bisogno dell'oscurità naturale per tessere la propria tela.[4]

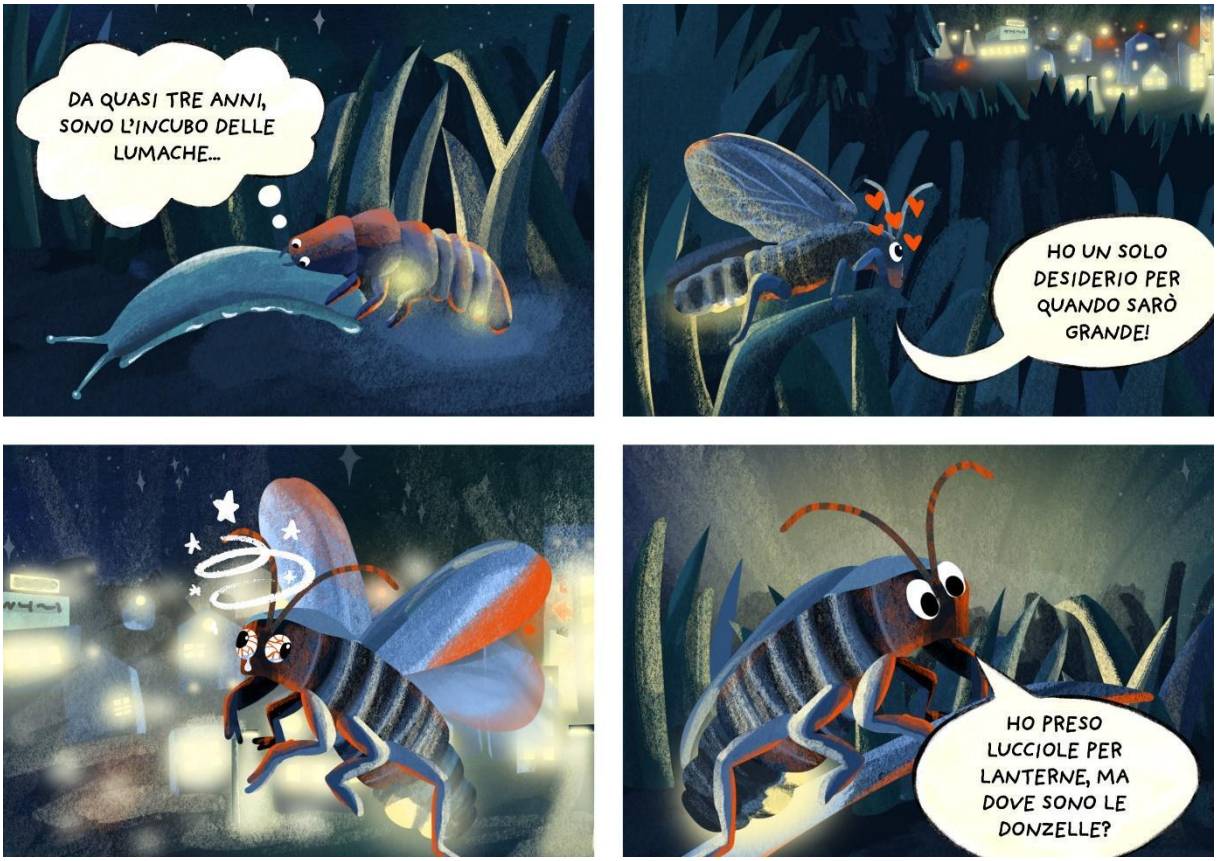
1 Knop E, Zoller L, Ryser R et al. (2017) Artificial light at night as a new threat to pollination. Nature 548:206-209.

2 van Langevelde F, Braamburg-Annegarn M, Huigens ME et al. (2017) Declines in moth populations stress the need for conserving dark nights. Global Change Biology 24:925-932.

3 Heiling AM (1999) Why do nocturnal orb-web spiders (Araneidae) search for light? Behav Ecol Sociobiol 46(1):43-49.

4 Zschokke S, Herberstein ME (2005) Laboratory methods for maintaining and studying web-building spiders. J Arachnol 33(2):205-213.

In chiara difficoltà: un amore non corrisposto



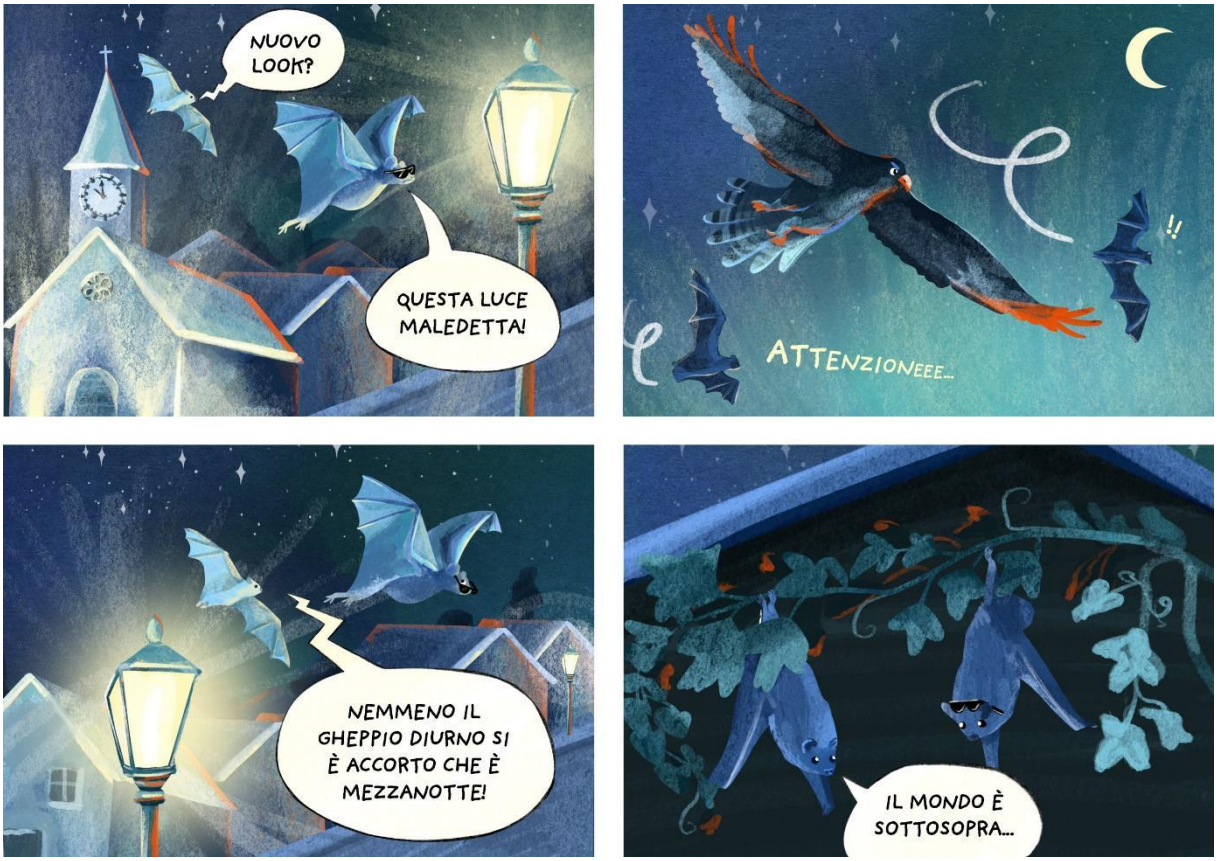
Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Le uova, le larve, le pupe, e i piccoli di lucciola, sia femmine (che non possono volare) che maschi, emettono luce. Questa speciale capacità prende il nome di bioluminescenza e serve ad allontanare i nemici e al contempo attirare i partner. Una sostanza luminescente, detta luciferina, subisce ossidazione da parte degli enzimi del gruppo luciferasi e l'energia di reazione fa brillare questi piccoli organismi. La luce artificiale può impedire la riproduzione dei coleotteri, ad esempio limitando in maniera significativa la portata dei loro segnali luminosi.[1, 2]

1 Ineichen S, Riesen M (2014) Kleine Lichter im lichten Wald : Leuchtkäfer leuchten nicht nur – sie stehen auch für eine gut strukturierte Landschaft mit hoher Biodiversität. Zürcher Wald. 2014(4):30-31.

2 www.gluehwuermchen.ch

In chiara difficoltà: l'ora del pipistrello



Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

I pipistrelli utilizzano l'ecolocalizzazione per orientarsi e catturare gli insetti al buio, inviando ultrasuoni e percependone l'eco. Tuttavia, questi mammiferi volanti sono dotati anche di occhi molto sensibili alla luce. La frammentazione e il ridimensionamento degli habitat (ferro di cavallo minore[1]), l'uscita ritardata dai rifugi (*vespertilio smarginato*[2]) e l'abbandono di determinati luoghi (*orecchione comune*[3]) sono tutti effetti negativi dell'uso notturno della luce artificiale. Per esempio, la nottola comune caccia gli insetti che sono attratti dalla luce artificiale, mentre i *myotis* evitano le zone illuminate.[4] In alcune valli montane della Svizzera, i pipistrelli della specie ferro di cavallo minore sono completamente spariti dopo l'installazione dell'illuminazione stradale. Al contempo, in queste zone, si sono diffusi i pipistrelli nani, che patiscono meno la luce. Il sospetto è che il ferro di cavallo minore sia scomparso a causa della pressione competitiva. Le due specie hanno all'incirca le stesse dimensioni e lo stesso spettro alimentare.[5] Inoltre, è già stato osservato che molti uccelli diurni usano la luce artificiale notturna a proprio vantaggio.[6]

1 Stone EL, Jones G, Harris S (2012) Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global Change Biology 18, 2458-2465.

2 Boldogh S, Dobrosi D, Samu P (2007) The effects of the illumination of buildings on house-dwelling bats and its conservation consequences. Acta Chiropterologica 9, 527-534.

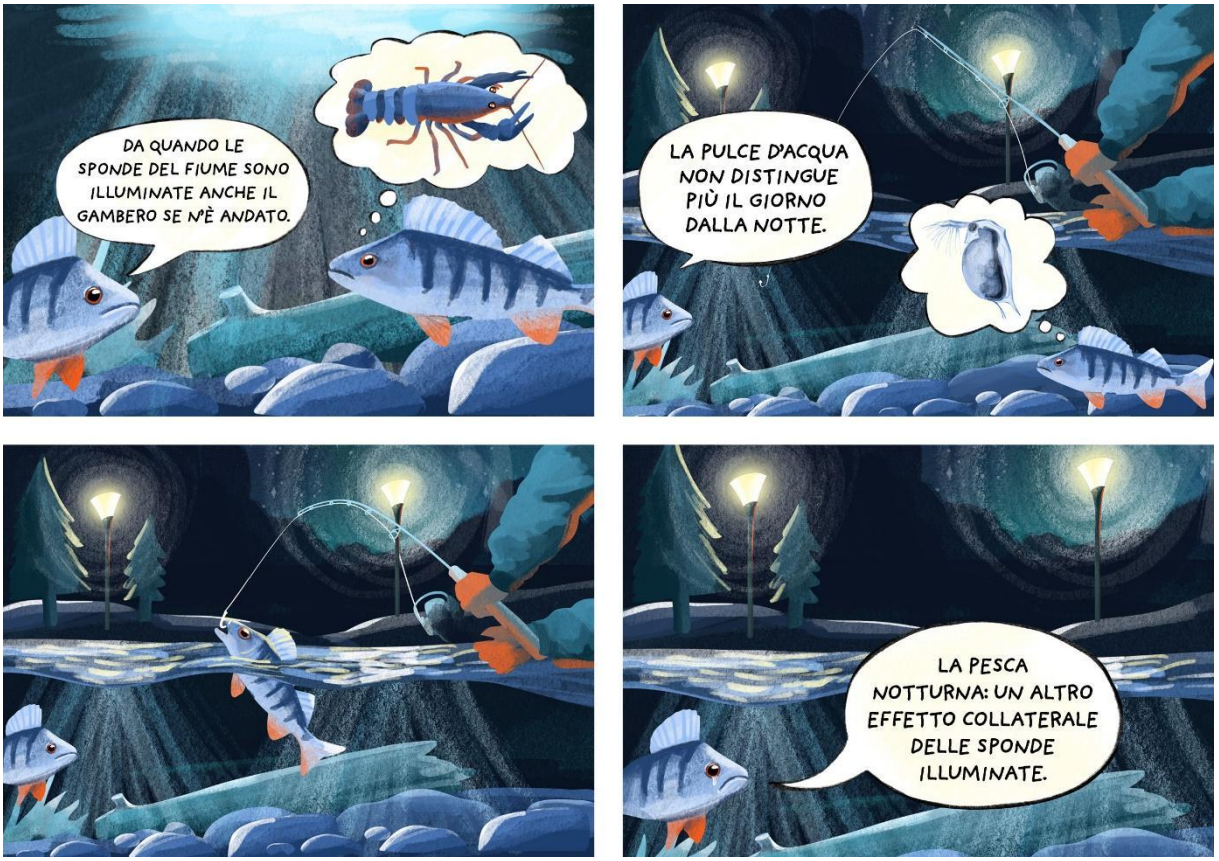
3 Rydell J, Eklöf J, Sánchez-Navarro S (2017) Age of enlightenment: long-term effects of outdoor aesthetic lights on bats in churches. Open Science 4, 161077.

4 Rydell J (2006) Bats and Their Insect Prey at Streetlights. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

5 Arlettaz R, Godat S, Meyer H (2000) Competition for food by expanding pipistrelle bat populations (Pipistrellus pipistrellus) might contribute to the decline of lesser horseshoe bats (Rhinolophus hipposideros). Biological Conservation 93:55-60.

6 Baumgart W (2006) Greifvögel und Eulen als Fledermaus-Jäger. Ornithol Mitt 58:292-309.

In chiara difficoltà: la notte sott'acqua



Che cosa succede di notte oltre la porta di casa? (c) Amber Catford

Alcuni pesci sono attivi di notte, come ad esempio il pesce persico, il quale preferisce cacciare al tramonto. In condizioni di laboratorio è stato scoperto che di notte è sufficiente un'intensità luminosa di 1 lx a ridurre la produzione di melatonina in questa specie ittica.[1] Pertanto, l'inibizione della sintesi della melatonina dovuta alla luce artificiale notturna non si verifica soltanto negli esseri umani. Se per noi questo ormone è importante, tra gli altri motivi, per le funzioni rigenerative, i suoi effetti su vasta scala in molti altri organismi restano sconosciuti. Un altro animale acquatico notturno è il gambero di fiume. I gamberi di fiume effettuano la muta soprattutto durante le fasi lunari più buie. Si presuppone che questo adattamento serva a proteggerli dai predatori.[2] Uno studio condotto nel Canton Zurigo ha confrontato la presenza di gamberi autoctoni con le luminosità notturne attuali: negli habitat potenzialmente idonei con luminosità costante superiore a 0,75 lx non è stato trovato alcun esemplare. Anche altri fattori, come l'assenza di strutture e la cattiva qualità dell'acqua, mettono in pericolo gli animali che vivono in questi luoghi.[3] Di notte, piccoli esseri viventi come le pulci d'acqua nuotano verso la superficie e si nutrono di alghe. Inoltre, l'inquinamento luminoso provocato dalle città ostacola il calare del buio. Ciò può disturbare la catena alimentare nelle acque e portare a eutrofizzazione.[4]

1 Brüning A, Hölker F, Franke S et al. (2015) Spotlight on fish: light pollution affects circadian rhythms of European perch but does not cause stress. Sci Total Environ 511:516–522

2 Franke R, Hoerstgen-Schwark G (2013) Lunar-Rhythmic Molting in Laboratory Populations of the Noble Crayfish Astacus astacus (Crustacea, Astacidea): An Experimental Analysis. PLoS ONE 8(7):e68653.

3 Schuler LD, Schatz R, Berweger CD (2018) From global radiance to an increased local political awareness of light pollution. Environmental science & policy 89:142-152.

4 Moore M, Pierce SM, Walsh HM et al. (2000) Urban light pollution alters the diel vertical migration of Daphnia. Verh Internat Verein Limnol 27(1-4):779-782.

Was passiert nachts vor unserer Haustüre?

Die Nacht ist nicht unbedingt Schlafenszeit, zumindest nicht für viele Tiere. Denn sie werden erst wach, wenn die Sonne untergeht.

Etwa zwei Drittel der Tierarten weltweit sind nachtaktiv, dazu zählt rund die Hälfte aller Insektenarten.[1] Nachtaktive Tiere sind auf Dunkelheit und natürliches Licht von Mond und Sternen angewiesen, um sich erfolgreich zu orientieren, fortzubewegen, fortzupflanzen, zu jagen bzw. Futter zu suchen sowie um Räubern und Nahrungskonkurrenten auszuweichen.

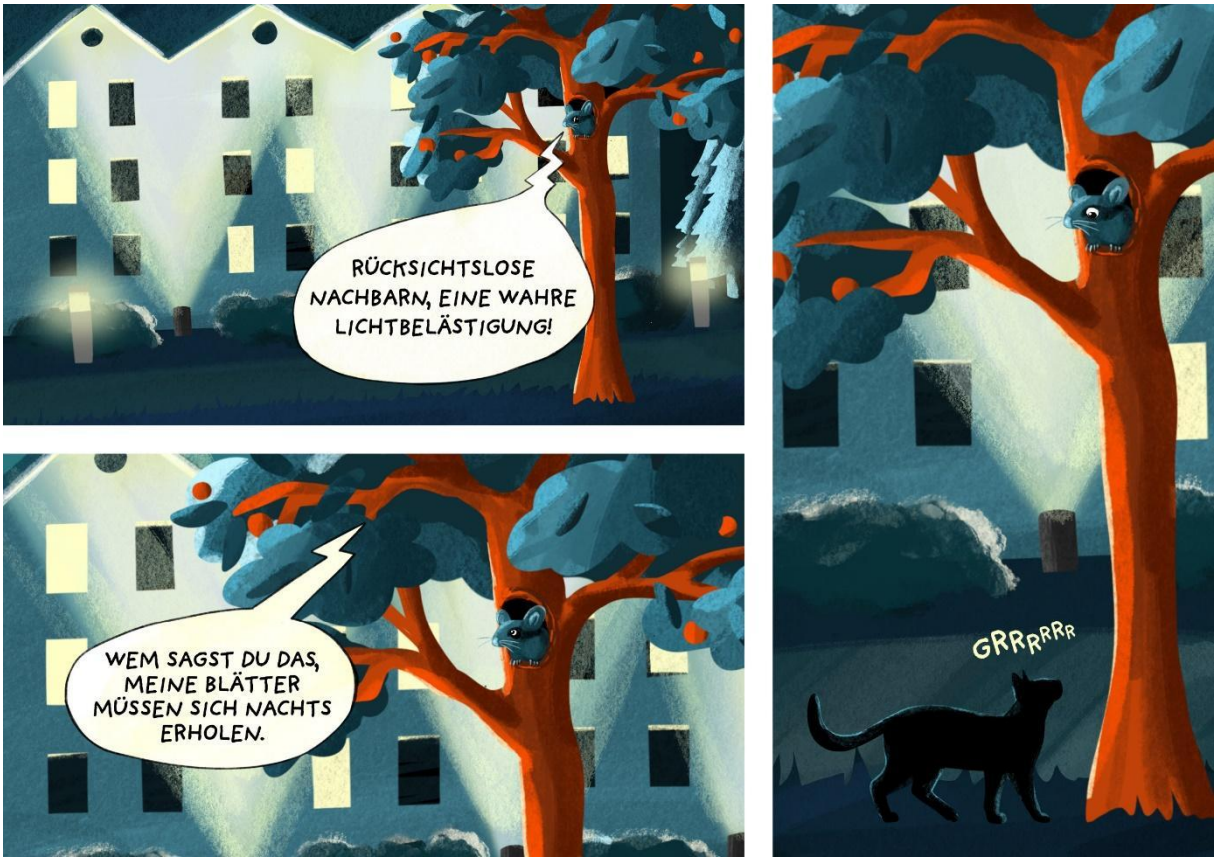
Kunstlicht in der Nacht beeinflusst Lebensfunktionen und -abläufe sowie das Verhalten von Tieren, was sich in Anlockung, Vertreibung oder Verlust der Orientierung äußert.

1 Hölker F, Moss T, Griefahn B et al. (2010) The Dark Side of Light: A Transdisciplinary Research Agenda for Light. Ecol Soc 15(4):13.

content: Stefanie Suchy, initiative "Plight with light", Tiroler Umweltanwaltschaft

translation: Project SKYSCAPE ITAT 2047, KP Interreg Italien-Österreich 2014-2020

Helle Not: Heimliche Nachbarn



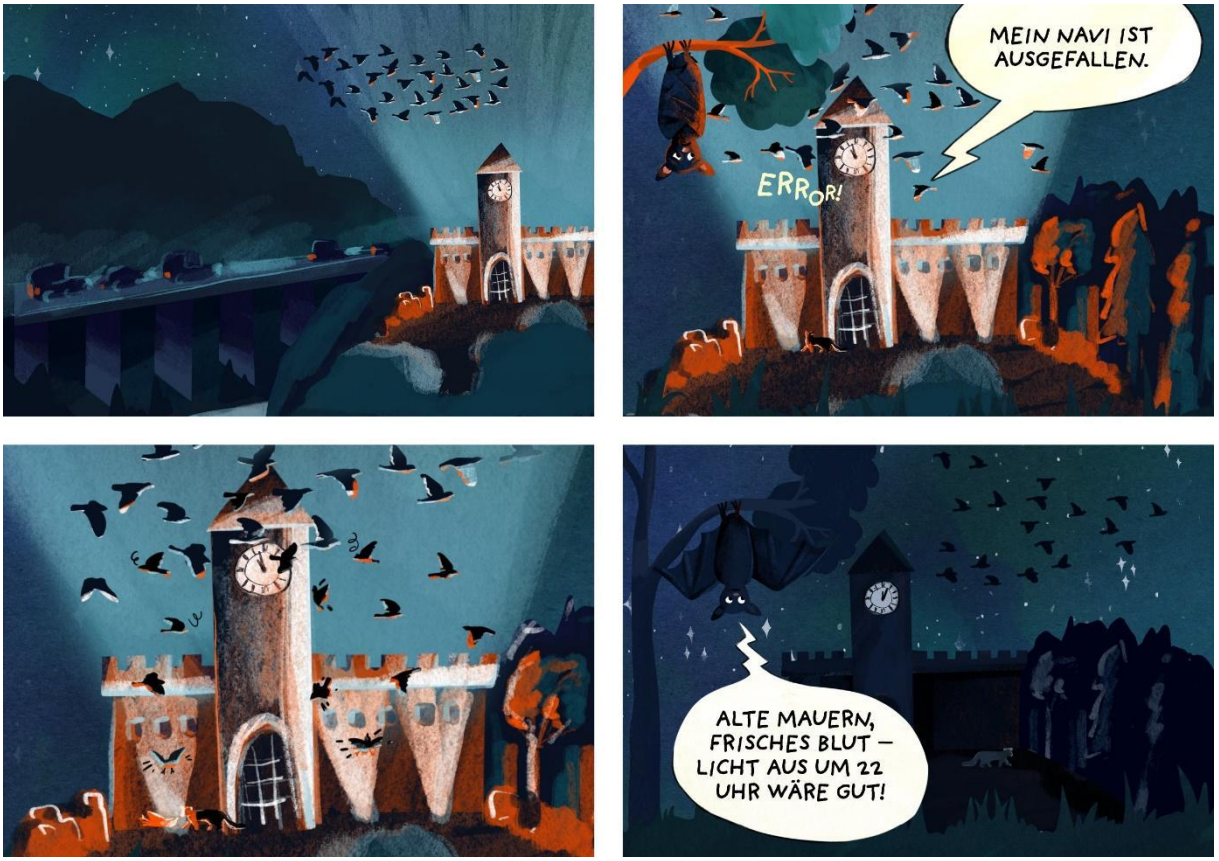
Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Menschen fühlen sich immer häufiger durch exzessiven Lichteinsatz des Nachbarn gestört. Zumindest können sich Menschen-Nachbarn verständigen und eine Lösung finden. Hat man den heimlichen, gefährdeten Gartenschläfer als Nachbarn, so muss man wissen, dass er ein nachtaktives Nagetier ist und die Dunkelheit braucht um Fressfeinden auszuweichen und mit empfindlichen, angepassten Sinnen Futter zu suchen. Der Schläfer ist ein Allesfresser, auch Nacktschnecken werden nicht verschmäht. Gartenschläfer leben trotz ihres Namens auch gerne im Wald. Nächtliches Kunstlicht verkleinert und zerschneidet den Lebensraum von Säugetieren, das Risiko als einfache Beute zu enden ist erhöht; bereits Vollmond-Helligkeit (max. 0,3 lx) verursacht bei vielen Nagetieren eine reduzierte Aktivität und Nahrungsaufnahme.[1] Und tatsächlich regenerieren sich Pflanzen nachts, Dauerbestrahlung schädigt das Fotosynthesevermögen.[2]

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (Hg) Ecological Consequences of Artificial Night Lighting. Island Press.

2 Kwak MJ, Je SM, Cheng HC et al. (2018) Night Light-Adaptation Strategies for Photosynthetic Apparatus in Yellow-Poplar (Liriodendron tulipifera) Exposed to Artificial Night Lighting. Forests 9(2):74.

Helle Not: Vogelzug



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

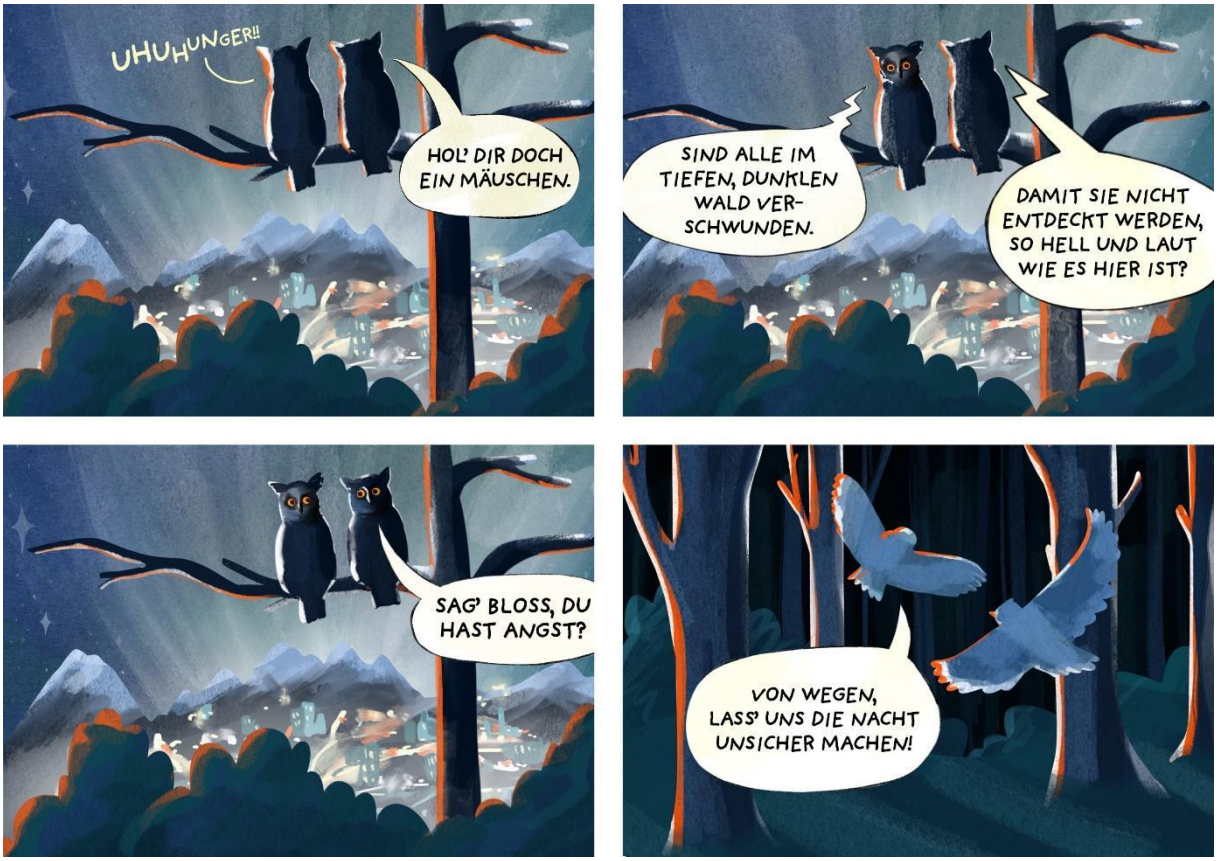
Die meisten Zugvögel wandern in der Nacht, da sie weniger Luftturbulenzen ausgesetzt sind und Energie sparen. Die Hauptzugzeiten sind von Februar bis Mai sowie von August bis November. Zugvögel, aber auch wandernde Fledermäuse, werden durch angestrahlte Objekte, Skybeamer und großflächig beleuchtete Areale in ihrer Orientierung gestört und geschwächt – mitunter mit tödlichem Ausgang.[1, 2] Am Alpenrand, an Gebirgsübergängen und in manchen Tälern können sich Vogelzüge konzentrieren, weshalb die Beleuchtung von Burgen, Berghütten, Gipfelkreuzen etc. an diesen Standorten zu vermeiden ist. Auch Windräder sind in jenen Bereichen eine letale Falle für die Tiere. Rund um Neumond verstärkt sich die Anziehungskraft der beleuchteten Anlagen; Dauerbeleuchtung lockt und irritiert mehr Zugvögel als blinkendes Licht,[3] welche Erkenntnis wiederum hinsichtlich der Warnleuchten für den Flugverkehr bedeutend ist.

1 Haupt H, Schillemeit U (2011) Lichtanlagen bringen Zugvögel vom Kurs ab. Natur und Landschaft. 43(6):165-170.

2 Voigt CC, Roeleke M, Marggraf L et al. (2017) Migratory bats respond to artificial green light with positive phototaxis. PLoS ONE 12(5):e0177748.

3 Gauthreaux SA, Belser CG (2006) Effects of Artificial Night Lighting on Migrating Birds. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

Helle Not: Räuber und ihre Beute



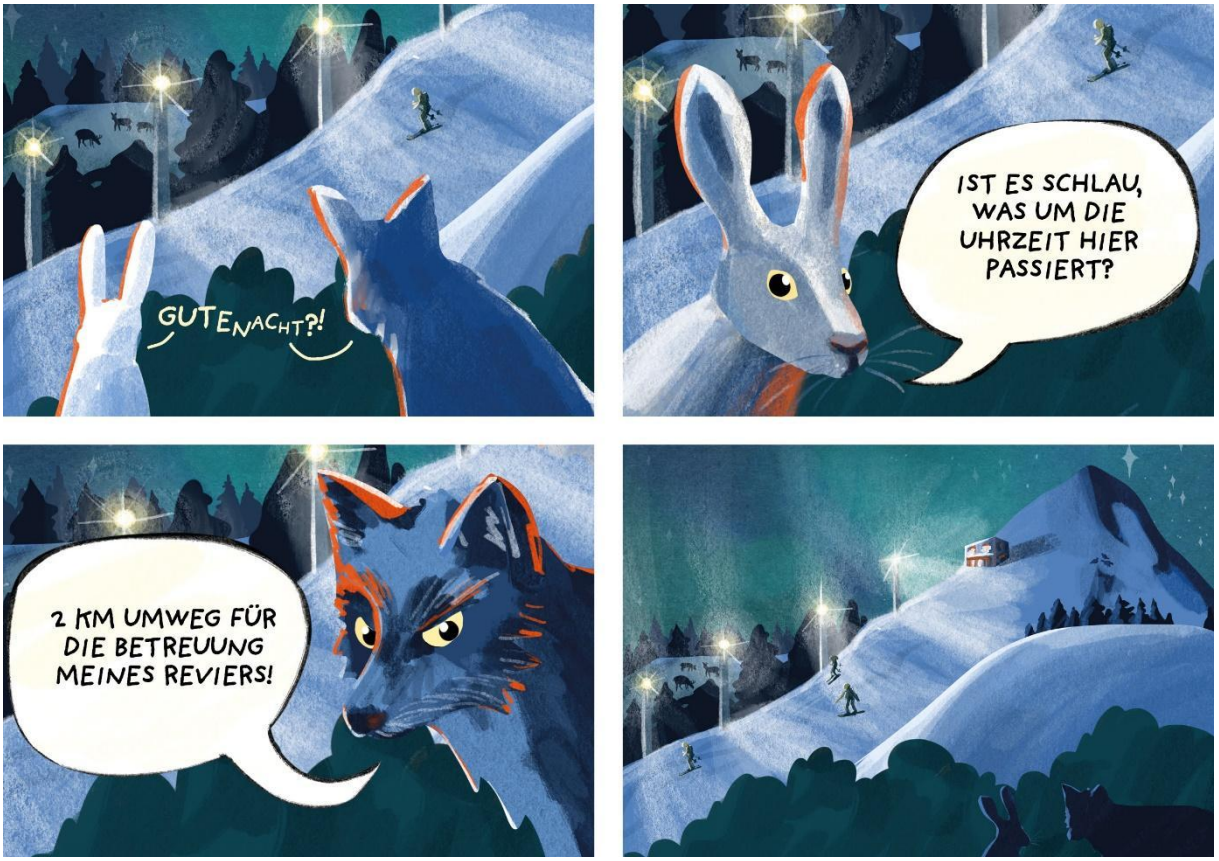
Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Der Uhu ist die größte Eule der Welt. Die Vögel können ihren Kopf bis zu 270 Grad drehen. Das wichtigste Sinnesorgan sind die Ohren, allein mit Hilfe des Gehörs können Eulen ein Beutetier lokalisieren und schlagen. Nachtaktive Säugetiere meiden offenes Gelände bei Vollmondlicht (max. 0,3 lx), sie schränken ihre Aktivität ein – wahrscheinlich um von potentiellen Räubern nicht gesehen zu werden.[1] Im Gegenzug wurde beobachtet, dass Uhus rund um Vollmond bewegungsfreudiger sind, längere Strecken zurücklegen und schneller fliegen.[2] Die Studien legen nahe, dass Tiere bereits bei sehr geringen nächtlichen Beleuchtungsstärken ihre Verhaltensweise ändern. Lichtsmog beleuchteter Täler und Städte dringt bis in natürliche Gebiete vor und beeinflusst Lebensräume und Arten.

1 Beier P (2006) Effects of Artificial Night Lighting on Terrestrial Mammals. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

2 Penteriani V, Kuparinen A, Delgado MD et al. (2011) Individual status, foraging effort and need for conspicuousness shape behavioural responses of a predator to moon phases. Animal Behaviour 82, 413-420.

Helle Not: Fuchs und Hase



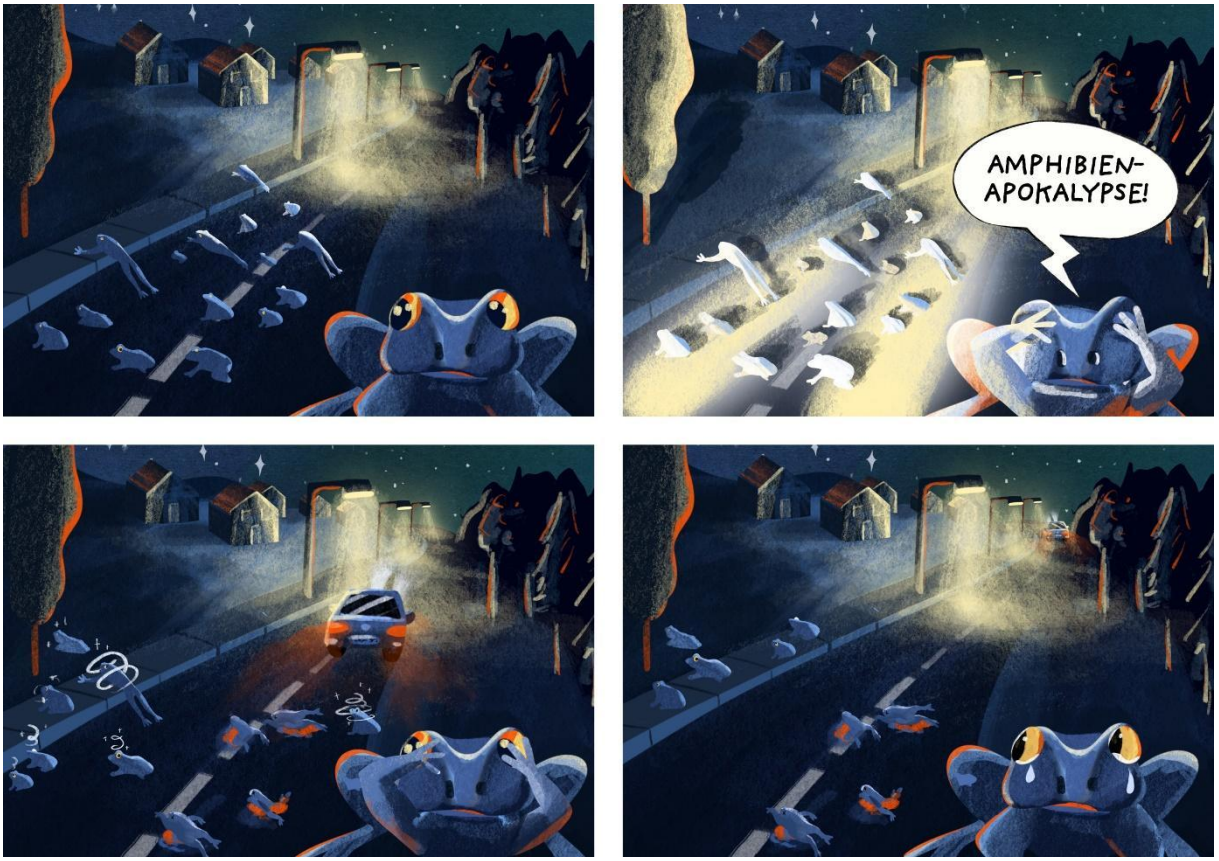
Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Viele Sportstätten befinden sich in naturnaher Umgebung und am Siedlungsrand. Eine Folgeerscheinung der nächtlichen Nutzung von Sportstätten ist Lärm durch den Betrieb und im Fall der Schipistenbeleuchtung noch längere Unruhe durch die Verschiebung der Pistenpräparierungszeit bis spät in die Nacht.[1] Dies kommt dem Alpenschneehasen nicht entgegen, denn er ist vorwiegend dämmerungs- und nachtaktiv. Die Tiere haben auch mit anderen Herausforderungen zu kämpfen: Sie sind Hochgebirgsbewohner; der Klimawandel lässt Höhenstufen nach oben wandern, eine Gipfelfalle für den Alpenschneehasen.[2] Rotfüchse sind in Menschennähe vorwiegend nachtaktiv, Hasen können durchaus auf ihrem Speiseplan stehen. Viele Tiere, darunter Raufußhühner und Rotwild, müssen im Winter aufgrund des Nahrungsmangels mit ihrer Energie haushalten. Beunruhigung durch bspw. Lärm und Licht lässt den Stoffwechsel hochfahren, die Tiere werden geschwächt.

1 Kostenzer J (2013) Leuchtende Hänge, lange Schatten – Nachtschilauf in Tirol. In: Held M, Hölker F, Jessel B. Schutz der Nacht – Lichtverschmutzung, Biodiversität und Nachtlandschaft. BfN-Skripten 336. Bundesamt für Naturschutz (Hg).

2 Rehnus M (2013) Der Schneehase in den Alpen. Ein Überlebenskünstler mit ungewisser Zukunft. Bristol-Schriftenreihe: Vol 38.

Helle Not: Nachts im Frühling



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

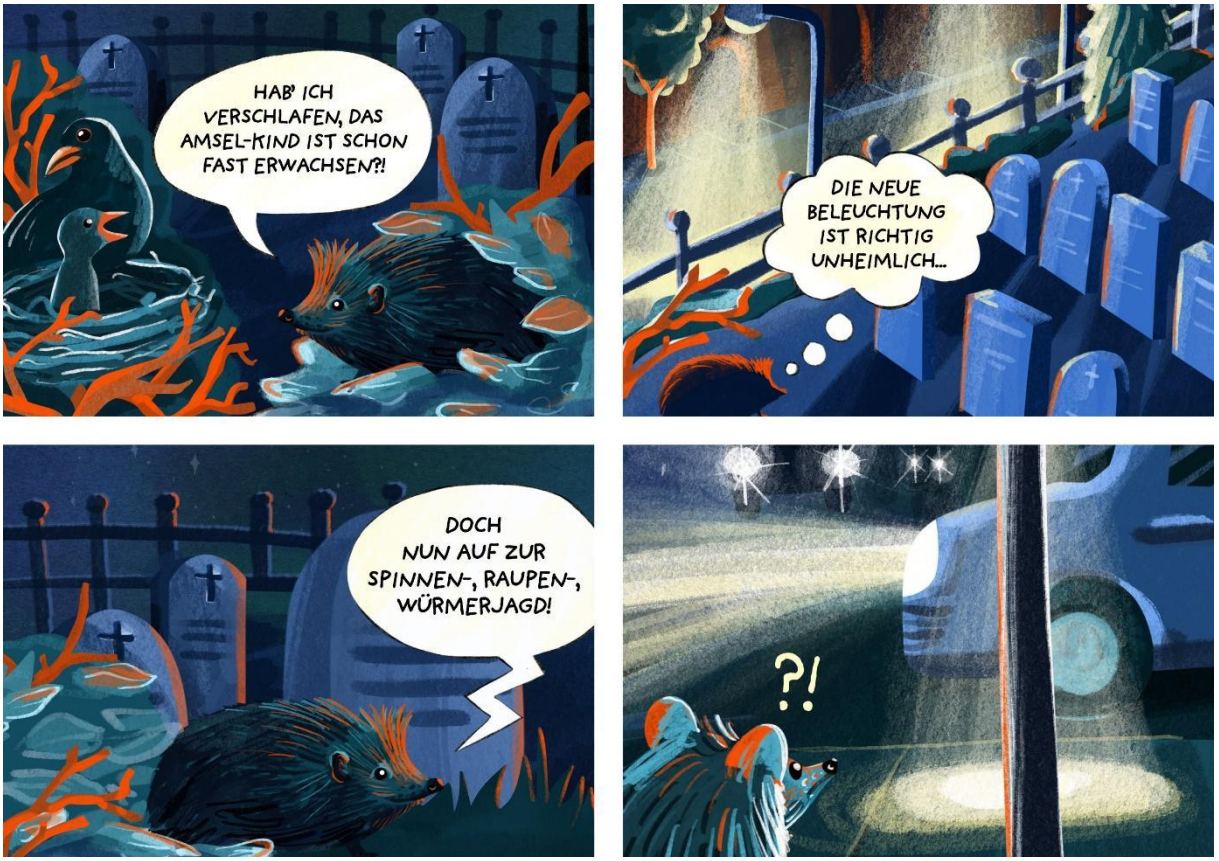
Die meisten Frosch- und Krötenarten sind teils oder vollkommen nachtaktiv und haben einen ausgeprägten Sehsinn. Der Grasfrosch kann sogar im Dunklen Farben wahrnehmen.[1] Und die Erdkröte benötigt nur einen Bruchteil des Sternenhimmel-Lichts – 0,00001 lx – für den nächtlichen Beutefang.[2] Um diesen Wert in Relation setzen zu können: Die max. Vollmondhelligkeit beträgt 0,3 lx. Nachtaktive Amphibien reagieren empfindlich auf Blendungen; die Dunkeladaptation kann mehr als eine Stunde andauern, in dieser Zeit fehlen wichtige visuelle Informationen.[2] Erdkröten bewegen sich im März bzw. April von ihren Winterquartieren zu den Laichgewässern, besonders zwischen der Dämmerung und 22 Uhr sind Massenwanderungen zu beobachten. Erdkröten nutzen dabei dunkle Passagen, sie meiden Straßenbeleuchtung.[3] Lebensraumverlust und Straßenverkehr sind große Gefahren für die Tiere.

1 Kelber A, Yovanovich C, Olsson P (2017) Thresholds and noise limitations of colour vision in dim light. Phil Trans R Soc B 372:20160065.

2 Buchanan BW (2006) Observed and Potential Effects of Artificial Night Lighting on Anuran Amphibians. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

3 van Grunsven RHA, Creemers R, Joosten K et al. (2017) Behaviour of migrating toads under artificial lights differs from other phases of their life cycle. Amphibia-Reptilia 38:49-55.

Helle Not: Welch ein Erwachen



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

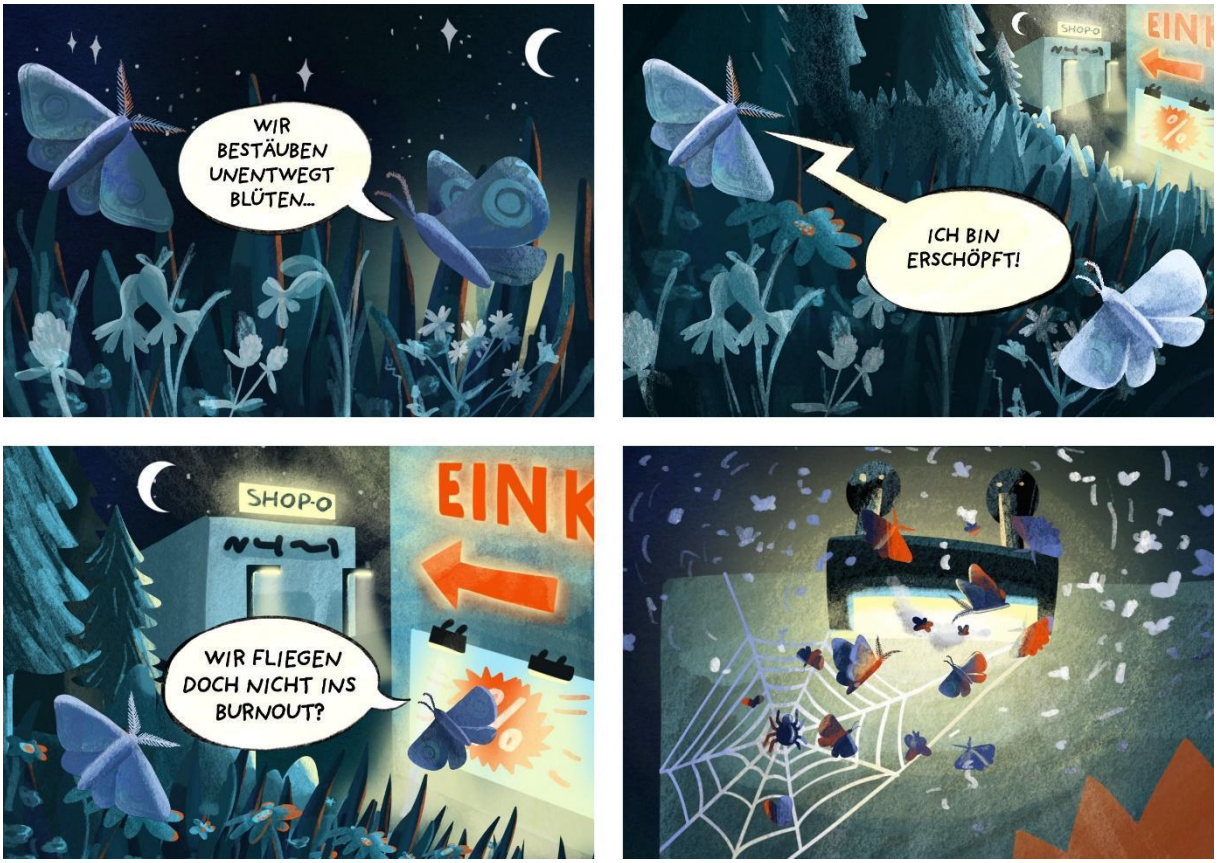
Naturnahe, giftfreie Gärten, Parks oder Friedhöfe mit Hecken, Durchschlupf-Möglichkeiten unter Zäunen sowie Laub- und Asthaufen sind gute Lebensräume für den dämmerungs- und nachtaktiven Braunbrustigel. Im April erwacht er aus dem Winterschlaf. Die Tiere begeben sich im Schutz der Dunkelheit mit ihrem sehr feinen Geruchsinn auf die Suche nach Insekten & Co. Urbane Igel meiden nachgewiesenermaßen künstlich beleuchtete Bereiche.[1] Lichtverschmutzung steigt mit zunehmender Verbauung, Lebensräume werden zerschnitten und zerstört. Straßen in den Siedlungsgebieten sind viel zu häufig eine tödliche Igel-Falle. Rotkehlchen, Amseln, Kohl- und Blaumeisen beginnen in beleuchteten Lebensräumen früher im Jahr mit dem Morgengesang. Die Folge ist eine frühere Brut, Nahrungssuche und Entwicklung, was wiederum die Lebenserwartung der Tiere beeinträchtigen kann.[2] Unter Laborbedingungen wurde festgestellt, dass eine stetige nächtliche Lichtintensität von 0,3 lx (Vollmondhelligkeit) männliche Amseln langfristig unfruchtbar macht.[3]

1 Schroer S, Weiß NS, Grubisic M et al. (2019) Analyse der Auswirkungen künstlichen Lichts auf die Biodiversität. Naturschutz und Biologische Vielfalt 168. Bundesamt für Naturschutz Bonn (Hg).

2 Da Silva A, Valcu M, Kempenaers B (2015) Light pollution alters the phenology of dawn and dusk singing in common European songbirds. Phil Trans R Soc B Biol Sci 370(1667):1-9.

3 Dominoni DM, Quetting M, Partecke J (2013) Long-term effects of chronic light pollution on seasonal functions of European blackbird (Turdus merula). PLoS One 8(12):1-9.

Helle Not: Fleißige Bestäuber



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Die meisten Schmetterlinge sind in der Nacht aktiv. Nachtfalter sind bedeutende Pflanzenbestäuber. Betörender Duft und helle Blütenfarbe zeichnen viele Pflanzen aus, die sich auf nachtaktive Bestäuber verlassen. Durch nächtliches Kunstlicht sinkt die Bestäubungsleistung nachweislich, weniger Früchte bzw. Pflanzensamen werden ausgebildet.[1] Lichtverschmutzung und insbesondere die Anlockwirkung von Kunstlicht spielt eine Rolle für den vergleichsweise massiven Schwund an Nachtfaltern.[2] Brückenkreuzspinnen bauen Netze gerne an baulichen Strukturen in Gewässernähe und profitieren von angelockten Insekten.[3] Spaltenkreuzspinnen hingegen benötigen natürliche Dunkelheit für den Netzbau.[4]

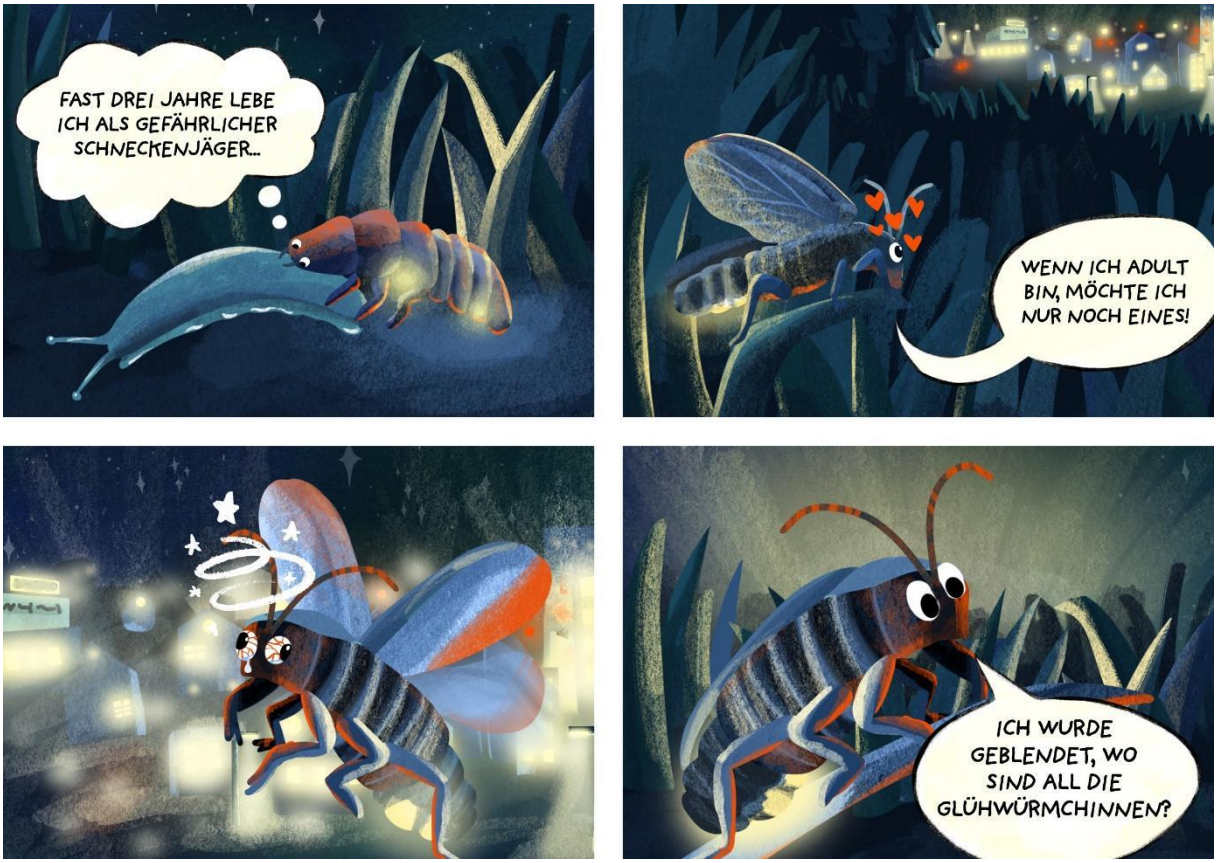
1 Knop E, Zoller L, Ryser R et al. (2017) Artificial light at night as a new threat to pollination. Nature 548:206-209.

2 van Langevelde F, Braamburg-Annegarn M, Huigens ME et al. (2017) Declines in moth populations stress the need for conserving dark nights. Global Change Biology 24:925-932.

3 Heiling AM (1999) Why do nocturnal orb-web spiders (Araneidae) search for light? Behav Ecol Sociobiol 46(1):43-49.

4 Zschokke S, Herberstein ME (2005) Laboratory methods for maintaining and studying web-building spiders. J Arachnol 33(2):205-213.

Helle Not: Unerfüllte Liebe



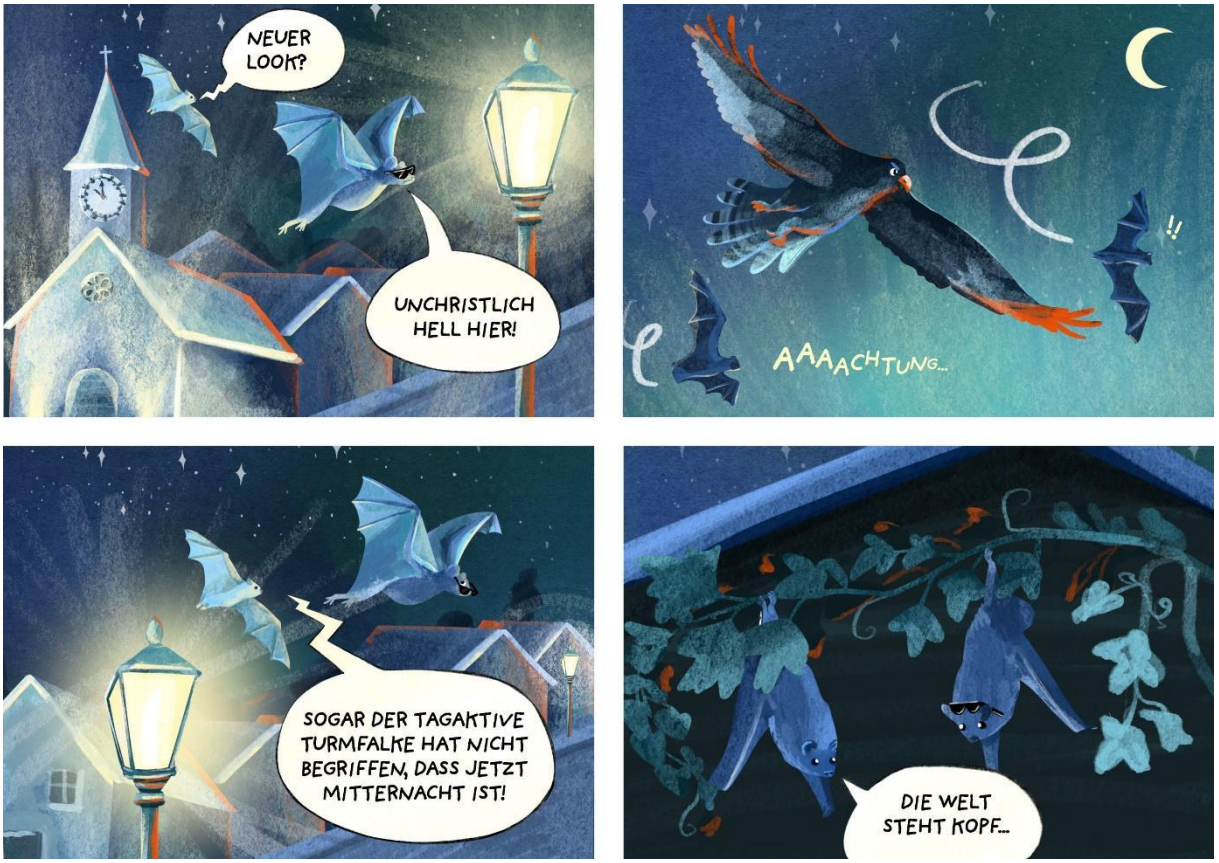
Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Eier, Larven, Puppen, Weibchen (sie sind nicht flugfähig) sowie Männchen des Kleinen Leuchtkäfers leuchten. Diese besondere Gabe wird Biolumineszenz genannt, sie dient der Feindabwehr und Partnerfindung. Der Leuchtstoff Luciferin wird durch das Enzym Luciferase oxidiert, die Reaktionsenergie lässt Organismen leuchten. Kunstlicht kann die Fortpflanzung der Käfer verhindern, so wird bspw. die Reichweite der tierischen Lichtsignale massiv eingeschränkt.[1, 2]

1 Ineichen S, Riesen M (2014) Kleine Lichter im lichten Wald : Leuchtkäfer leuchten nicht nur – sie stehen auch für eine gut strukturierte Landschaft mit hoher Biodiversität. Zürcher Wald. 2014(4):30-31.

2 www.gluehwuermchen.ch

Helle Not: Zeit der Fledermaus



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Um sich im Dunkeln orientieren und Insekten fangen zu können, nutzen Fledermäuse die Echoortung. Sie senden Ultraschall aus und lesen das Echo. Die Flugsäuger haben jedoch auch lichtempfindliche Augen. Zerschneidung und Verkleinerung des Lebensraumes (z.B. Kleine Hufeisennase[1]), verspäteter Ausflug aus den Quartieren (z.B. Wimperfledermaus[2]) und Aufgabe von Quartieren (z.B. Braunes Langohr[3]) sind negative Auswirkungen des nächtlichen Kunstlichteinsatzes. Der Große Abendsegler bspw. jagt vom Kunstlicht angelockte Insekten, Mausohren hingegen meiden beleuchtete Bereiche.[4] Die Kleine Hufeisennase verschwand in einigen Bergtälern der Schweiz vollkommen, nachdem Straßenbeleuchtung installiert wurde. Gleichzeitig verbreitete sich die weniger lichtscheue Zwergfledermaus in diesen Bereichen. Der Verdacht liegt nahe, dass die Kleine Hufeisennase durch Konkurrenzdruck verschwand. Beide Arten sind ungefähr gleich groß und haben das gleiche Nahrungsspektrum.[5] Auch dass so manch tagaktiver Vogel nächtliches Kunstlicht zu seinem Vorteil nutzt, wurde bereits beobachtet.[6]

1 Stone EL, Jones G, Harris S (2012) Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global Change Biology 18, 2458-2465.

2 Boldogh S, Dobrosi D, Samu P (2007) The effects of the illumination of buildings on house-dwelling bats and its conservation consequences. Acta Chiropterologica 9, 527-534.

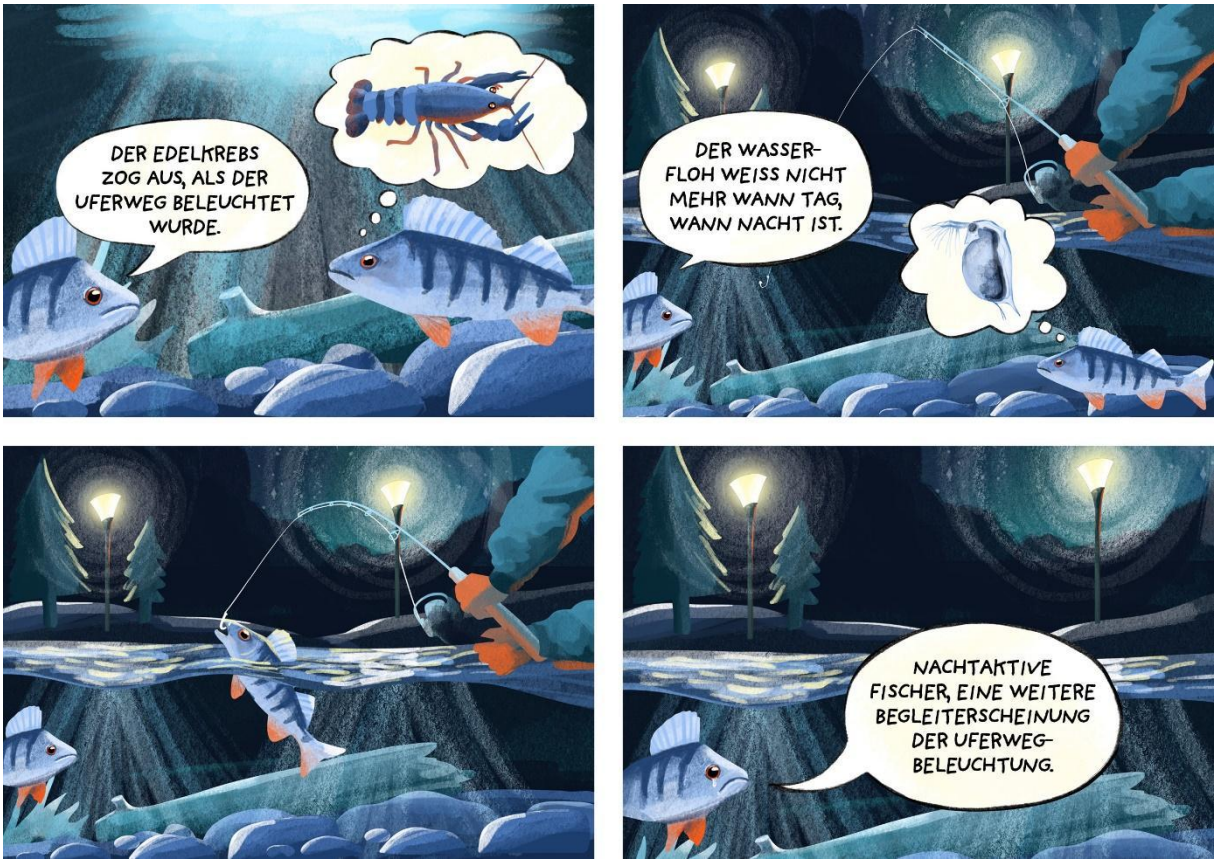
3 Rydell J, Eklöf J, Sánchez-Navarro S (2017) Age of enlightenment: long-term effects of outdoor aesthetic lights on bats in churches. Open Science 4, 161077.

4 Rydell J (2006) Bats and Their Insect Prey at Streetlights. In: Rich C, Longcore T (Hg): Ecological Consequences of Artificial Night Lighting. Island Press.

5 Arlettaz R, Godat S, Meyer H (2000) Competition for food by expanding pipistrelle bat populations (Pipistrellus pipistrellus) might contribute to the decline of lesser horseshoe bats (Rhinolophus hipposideros). Biological Conservation 93:55-60.

6 Baumgart W (2006) Greifvögel und Eulen als Fledermaus-Jäger. Ornithol Mitt 58:292-309.

Helle Not: Unterwassernacht



Was passiert nachts vor unserer Haustüre? (c) Amber Catford

Einige Fische sind nachts aktiv, so auch der Flussbarsch, er jagt gerne in der Dämmerung. Unter Laborbedingungen wurde herausgefunden, dass nachts bereits eine Lichtintensität von 1 lx die Melatonin-Produktion im Flussbarsch unterdrückt.[1] Das Phänomen der gehemmten Melatonin-Synthese durch Kunstlicht in der Nacht tritt also nicht nur beim Menschen auf. Während das Hormon unter anderem für unsere Regeneration von Bedeutung ist, sind die weitreichenden Auswirkungen auf viele Organismen unbekannt. Ein weiteres nachtaktives Wassertier ist der Edelkrebs. Edelkrebse häuten sich vor allem während dunkler Mondphasen; die Vermutung liegt nahe, dass sie sich mit dieser Anpassung vor Räubern schützen.[2] Eine Untersuchung im Kanton Zürich verglich das Vorkommen von heimischen Krebsen mit vorhandenen nächtlichen Helligkeiten, keine Individuen kamen in potentiell geeigneten Habitaten mit stetigen Helligkeiten von über 0,75 lx vor; auch andere Faktoren wie Strukturarmut und schlechte Wasserqualität gefährden an diesen Standorten die Tiere.[3] Im Schutz der Nacht schwimmen tierische Kleinstlebewesen, wie Wasserflöhe, in Richtung Wasseroberfläche und ernähren sich dort von Algen. Bereits Helligkeiten, die von Lichtglocken der Städte verursacht werden, unterdrücken den nächtlichen Aufstieg. Dies kann die Nahrungskette in Gewässern stören und zu häufiger Algenblüte führen.[4]

1 Brüning A, Hölker F, Franke S et al. (2015) Spotlight on fish: light pollution affects circadian rhythms of European perch but does not cause stress. Sci Total Environ 511:516–522

2 Franke R, Hoerstgen-Schwark G (2013) Lunar-Rhythmic Molting in Laboratory Populations of the Noble Crayfish Astacus astacus (Crustacea, Astacidea): An Experimental Analysis. PLoS ONE 8(7):e68653.

3 Schuler LD, Schatz R, Berweger CD (2018) From global radiance to an increased local political awareness of light pollution. Environmental science & policy 89:142-152.

4 Moore M, Pierce SM, Walsh HM et al. (2000) Urban light pollution alters the diel vertical migration of Daphnia. Verh Internat Verein Limnol 27(1-4):779-782.