

ISSN 2976-9078
ISSUE 15 / MAY 2025

*J*OURNAL *of*
BIOPHILIC DESIGN



LIGHT

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ISSUE 16, July / August 2025 – SOUND
ISSUE 17, September / October 2025 – ARCHITECTURE
ISSUE 18, November / December 2025 – INTERIOR DESIGN

Journal of biophilic design (Print)	ISSN 2754-2815
Journal of biophilic design (Online)	ISSN 2976-9078

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WELCOME

Welcome to the fifteenth edition of The Journal of Biophilic Design.

The Biophilic Design framework specifies healthier environments for people and all life. When Biophilic Designers specify a room, a building or even a city, we look at everything from sensory impact of our environment to the physical and mental health impact of the materials and products we recommend.

Light is one of the most important aspects of Biophilic Design, and this issue is packed full of the science behind why and how our biology responds to light, exploring everything from evolutionary developments to how light affects our DNA. We also look at how light impacts the natural world around us, so that when we specify, we make sure that lights are angled correctly and the correct temperature lighting so that the impact on the natural world is reduced. We use the 'right light' 'right place' mindset. Plus, we also hear from lighting designers, artists, architects and scientists as well as the RSPB, academics, plant experts and more.

When I first started the Journal, I remember speaking to an interior landscaper who said that we should never put plants at the back of the office where there are no windows and natural light. If we do, they

wither and die. You would think this is common sense. But yet, it's ok to put people at the back of the office where there is no natural light or circadian rhythm perception. We are biological beings, like plants. And just like plants we NEED natural light to survive.

"Light is not merely a technical element, it is a living, sensory material that shapes our experiences. In nature, light drives growth, movement, rhythm, and behaviour. In design, it has the power to influence how we feel, connect, and inhabit spaces," light designer Lilian van Daal in this issue explores how we embrace this in design.

As Ulysse Dormoy describes in this issue: *"All life on earth has evolved under the full solar spectrum, we've understood photosynthesis for the last 250 years, and we are only now starting to understand that there is a mirror image process that takes place in living creatures, humans included."*

Knowledge is powerful, and being armed with the copious amount of research and learning that is distilled for you in this issue of the Journal will, I hope, inspire you. Please use this Journal to show clients and stake holders why you are specifying biophilically. Together our voices are stronger.

Vanessa Champion PhD, AMRSPH
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HIGHLIGHTS

Each edition of The Journal of Biophilic Design has regular sections. We highlight them here so you can navigate your way around the Journal. If you would like to contribute to a future edition, please do contact our editor we would love to feature your research and case studies.

4 Issue 15 – Light

- 6 Rediscovering Light and Darkness
- 12 Invisible Interior Design
- 18 Euroluce 2025: A Radiant Journey through Light, Craft, and Sustainability
- 26 Sensory Artistry, Light and Wellbeing
- 30 Top tips and benefits for biophilic lighting
- 34 The Art and Science of Natural and Artificial Light in Architectural Design
- 36 Balancing Brightness and Silence
- 42 The Enigmatic Mystery that is Light
- 48 Biophilia & Light: Getting the Right Balance
- 54 Light through Nature's Eyes
- 60 Eating Under a Living Sky
- 66 How can we be creative with lighting, whilst remaining mindful of its impact?

72 Science Behind Biophilic Design

- 74 The Full Spectrum of Human Sustainability
- 82 Daylight and biophilia in the workplace
- 86 Where Sunlight meets Timber – Crafting Spaces that breathe with Nature
- 92 On the Right Wavelength
- 98 The Biology Behind Biophilic Design

104 Plants

- 106 Biomaterial Desk Lamps
- 110 Plants for light – and dark – spaces
- 116 Enhancing Garden Design with Lighting – Tips from William Sugg & Co.
- 120 Lighting or Fighting for Life

124 Environment, People, Planet

- 126 When the Lights stay on – how we are unbalancing Nature
- 134 Letting Nature take the Lead
- 140 One Planet Living
- 144 The School of Biophilia
- 152 How many moths does it take to change a lightbulb?

158 Wellbeing

- 160 Shining the light on circadian rhythms
- 168 How to light your home for wellbeing
- 172 Painting Life back into White Walls
- 180 Light Is Consciousness

184 Biophilic Cities

- 186 Reimagining London's Grey Belt?
- 188 Swift Street
- 192 Bookshelf
- 194 Final Word

Details of our contributors can be found on our website.

Each edition of The Journal of Biophilic Design is published every other month.

Next issue's focus is **Sound**.

Sign up for [our newsletter](#) on [our website](#) to be reminded when the edition is out. Don't forget you can read this on your Kindle as well as buy a beautiful full colour printed edition to keep and refer back to, contact us for direct links.

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Future editions will focus on Sound, Architecture, Interior Design.

LIGHT

Rediscovering Light and Darkness

“Our cities, bathed in relentless artificial brightness, have forsaken the delicate dance of light and shadow – a trade-off that mirrors Schlemihl’s lamentable bargain and leaves us starved of the emotional resonance and nuanced beauty once found in nature’s interplay. By reimagining our built environments with lighting that mimics the organic, ever-shifting patterns of sunlight through leaves, we can reclaim the lost poetry of dusk and dawn, restoring a rhythm that speaks to both our well-being and our soul.”

Brice Schneider

Light unveils the world, but shadow gives it meaning.

Our cities are awash in artificial illumination, erasing the interplay between light and darkness. Progress is now measured in lumens per watt rather than depth, atmosphere, or emotional resonance. We are told that light equates to clarity, safety, productivity, and visibility, but what if, in this obsessive quest for illumination, we have lost something essential?

This loss is nothing new. In *Peter Schlemihl’s Remarkable Story* (1814), Adelbert von Chamisso tells of a man who trades his shadow for a bottomless purse of gold. At first, Schlemihl revels in his newfound wealth, but he soon realizes that without his shadow, he is an outcast – his very humanity questioned. While traditionally interpreted as a fable about wealth and social belonging, this story also serves as a deeper allegory – our modern disconnection from the natural balance of light and shadow, presence and absence, brightness and obscurity.



We too have made a bargain. In exchange for the convenience of perpetual brightness, we have severed our relationship with the organic rhythms of light. We have created environments where shadows have been banished, and where the quiet drama of sunlight filtering through leaves has been replaced by static, uniform illumination. Like Schlemihl, we are beginning to recognize the cost of this trade. And perhaps it is time to reclaim our shadow – not as an absence of light, but as a realm of nuance, interplay and transformation.

Shifting patterns of light.

Michel Eugène Chevreul's work on simultaneous contrast demonstrated that the eye perceives vibrancy through juxtaposition, not uniformity. A similar process happens in nature when forest canopies filter and scatter sunlight into ever-changing patterns. Sunlight is refracted and diffused through layers of leaves and branches, forming dappled light with soft, unfocused edges that create a dreamlike quality. As the wind moves the leaves, light patterns shift, producing an environment that feels alive, immersive, and deeply human.

What if architectural lighting could mimic this complexity? Rather than imposing rigid artificial brightness, lighting design could embrace diffusion, layering, and movement – creating spaces that adapt, breathe, and resonate with human perception. Just as Impressionist painters used fragmented brushstrokes to capture the fleeting essence of light, lighting designers can explore the use of pattern



in illumination design to enhance spatial perception. By incorporating textured surfaces and perforated screens, we can replicate the intricate lighting effects found in nature, casting evolving shadows throughout a space. And we can weave subtle allusions to nature into a space through light projections that animate a wall surface or floor, simulating the variability and movement of nature's rich tapestry.

emotional depth to a space, we can also embrace contrast by creating shadows that guide perception, emphasize form and accentuate materiality. Instead of washing spaces in uniform brightness, thoughtful lighting placement can enhance the architectural contours and textures in a space. The presence of shadows heightens intimacy and evokes a sense of exploration and discovery – sensations we experience when we immerse ourselves in the natural world.

Light as a living element.

Ernst Rudolf Zürcher's research has revealed that trees, far from being static, are subtly influenced by the moon's cycle. Their trunks expand and contract in rhythm with lunar gravitational shifts, a phenomenon that hints at the deep, often unnoticed connections between celestial cycles and biological life. If trees can sense and respond to the moon, what does this say about human beings? How much of our own biological and psychological wellbeing has been disrupted by the loss of night's natural cadence?

The erasure of true darkness from our environments – through excessive artificial lighting – has not only severed our connection to the stars but also altered our circadian rhythms, hormonal cycles, and capacity for wonder. Dynamic, adaptive lighting systems offer a way to restore this lost depth and rekindle our bond with the rhythms of nature. By emulating the natural shifts in colour and intensity that make daylight so dynamic, we can create lighting schemes that are continually evolving rather than static. This involves layering diffuse and dynamic light to mirror the natural gradations of tone that occur throughout the day, supporting the body's circadian rhythms. Such an approach enhances sensory richness, transforming artificial illumination into a living element that reflects the complexity of natural light.

Reclaiming the beauty of shadow.

Rather than selling our shadow for the illusion of control, we should embrace its presence. Light is so much more than a source of visibility, so it is time to move beyond uniform brightness and rediscover the beauty of patterned illumination, dynamic transitions, and the balance of light and dark.

It is time to reclaim our shadow – and with it, our connection to nature.

Brice Schneider, Design Director, Nulty
<https://www.nultylighting.co.uk>



INVISIBLE INTERIOR DESIGN

*“Have you ever sensed a space speaking to you without words?
Discover how unseen forces shape our experiences – and why
understanding them could change the way you design, feel, and live.”*

Emi Melin

Have you ever walked into a space and immediately felt at ease, or subtly unsettled without knowing why? Beyond what we see, spaces communicate with us through invisible elements: the warmth of light, the rhythm of sound, the elusive shift in air, or even the lingering energy of those who were there before us.

The Hidden Dimension of Interior Design

From my own professional journey in interior and architectural design, sensory and emotional factors often remain secondary to tangible and physical considerations. While I have created many beautiful yet functional spaces, I have come to realise that an essential dimension of design has

been overlooked: the invisible aspects of interior space. Our experience of a space is shaped not only by what we see but also by what we feel: natural light, temperature shift, air quality, sound, scents, and even human emotions. These invisible factors create an unspoken dialogue between space and us, influencing mood, focus, and well-being. The concept of Invisible Interior Design introduces a design approach that extends beyond the visible world and considers the unseen elements that shape our spatial experiences. Just as forests, rivers, and skies compose the physical world, vibrations, energy fields, and emotional currents form an “invisible landscape.” By integrating intangible landscapes into architecture, we can create spaces that enhance the quality of our lives.



The Science of the Unseen

Shadow and Light: balance is the essence of all things. Neither can exist without the other – Yin and Yang



Shaping spaces is an art, and I find immense joy in bringing visions to life – designing and transforming every visible aspect of a space into something meaningful. However, studies from diverse fields including psychology, neuroscience and quantum physics demonstrate that non-physical factors play a vital role in how we feel and behave within a space. For example, sound frequencies can affect cognitive performance – some enhance focus, others trigger stress. Air quality and scent subtly influence mood, emotional and subconscious responses. Light, temperature, and electromagnetic fields modulate our circadian rhythms and energy levels. Human energy and emotions create an intangible atmosphere within a space.



Invisible Landscapes in Design

Psychologist Robert Plutchik's Emotion Wheel illustrates how emotions blend like colours, forming complex psychological states. Just as colour theory guides interior palettes, emotional landscapes can inform spatial design.

Consider fire as an emotional metaphor: a spark of frustration can escalate into anger. If unnoticed, it spreads, impacting others. If diffused early, it can be extinguished before becoming destructive. This principle applies to spatial design. Thoughtfully designed environments can help diffuse stress, enhance relaxation, and foster emotional stability. Some practical applications include calm-inducing, mood-adjusting, and focus-enhancing spaces.

Understanding the invisible allows us to design with deeper intention. We can use energy flow mapping to identify pressure points and harmonise movement, apply emotional zoning to design areas that encourage specific emotional states, and harness frequencies to tune into positive vibrations and their spatial impact.

Nature's Blueprint & Frequency-Based Design

Cymatic Therapy, pioneered by researcher Dr. Peter Guy Manners, explores how sound frequencies influence the body



and mind. My mentor, Chris Gibbs – an original student of Dr. Manners and a current NHS complementary medicine practitioner – continues to develop this powerful approach. The principle of vibrational healing suggests that specific frequencies resonate with human biology, influencing health and emotions. By incorporating this concept into architecture, we can create spaces that harmonise with biorhythms and enhance well-being.

Similarly, by embracing biophilic design principles, we can create environments that synchronise with the rhythms of nature. Just as ecosystems maintain a delicate balance, spaces can incorporate natural geometries, growth patterns, and resonance to foster emotional stability and sensory richness. Whether through materials that respond to vibration, gentle circadian light shifts, or immersive sound and scent-scapes, we can design environments that speak to all senses.

The Interaction Between Emotions and Environment

Kūkai, a Japanese Buddhist monk (774–835AD), wrote: “The environment transforms with the heart. If the heart is impure, the surroundings become clouded. If the heart is clear, the environment is serene.” This highlights the interplay between inner emotions and external spaces.





The Future of Spatial Experience

Invisible Interior Design invites a shift from conventional thinking by embracing multisensory and non-visual dimensions of space. By weaving sound, frequency, emotion, and energy into spatial planning, we unlock new layers of experience. Design is not just about what we see; it is about what we sense. By acknowledging the invisible landscapes within every space, we take a step toward a deeper, more holistic understanding of interior design.

Emi Melin, *Interior Designer & Creative Director* +Creatives / MUJIGEN SPACE LAB

<https://pluscreatives.co.uk>

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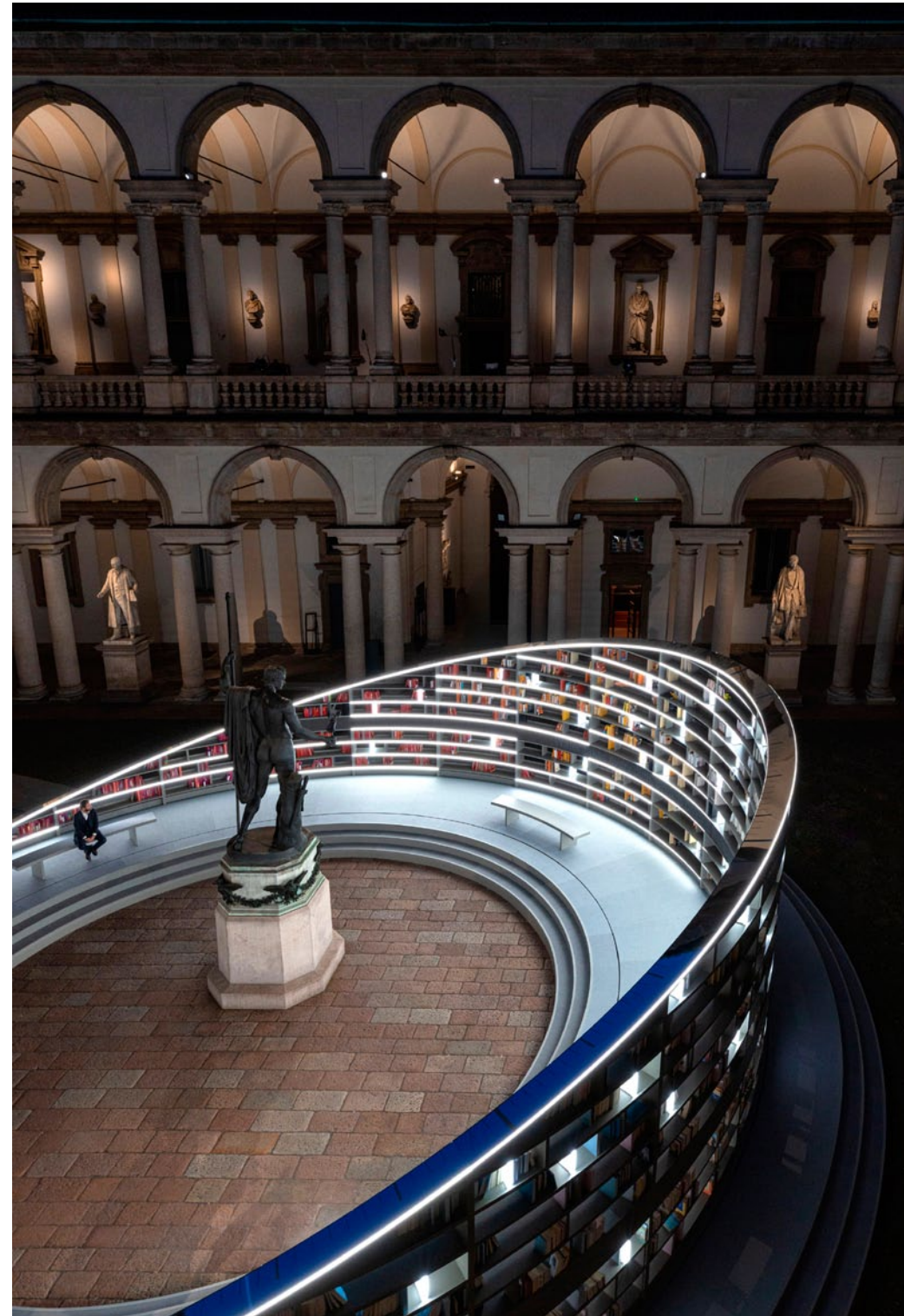
Euroluca 2025: A Radiant Journey through Light, Craft, and Sustainability

Odile Smith

Between the 7th and the 13th of April 2025, after two years, Milan once more became a city of light – quite literally – as **Euroluca** returned as part of Salone del Mobile. More than just a design fair, Euroluca is a celebration of light in all its forms: artistic, architectural, emotional, and increasingly, ethical. As always, this year's edition was packed, dynamic, and rich with ideas. Whether inside the vast halls of Fiera Milano Rho or spread across the city in the Fuorisalone, the event reaffirmed its role as a central pillar of Milan's cultural and design calendar.

In 2025, the attempt was to shift conversation, to talk not just about aesthetics – but also about values: sustainability, heritage, materiality, and emotion.

Here is just a short highlight of what I found interesting.



A Beacon in Brera – Es Devlin's "Library of Light"

One of the most captivating experiences this year was not inside the Salone, but at the Accademia di Belle Arti di Brera, itself a breathtaking venue (and one of my personal favourites). Although there were several light installations around the city this is the one that elegantly whispered to me.

Here, British artist and stage designer **Es Devlin** unveiled *Library of Light* – an 18-meter-diameter circular pavilion inspired by Umberto Eco's idea that "books are the compass of the mind."

Filled with over 2,000 books and surrounded by mirrored walls, the installation created a meditative atmosphere that shifted dramatically with the natural light. I visited in the late afternoon, when the warm Milanese sun amplified the contrasts, casting soft shadows and golden reflections throughout the space. It was a quiet, reflective moment – one that captured the power of light to transform not just a space, but our state of mind.

A Beacon in Brera – Es Devlin's Vibia – Weaving Light into Form

Inside the main fair in Rho, **Vibia** delivered a collection that blended architecture with a tactile softness. Some of their latest luminaires the collection “Array” from designer Umut Yamac widens this investigation into the materiality of light with a design based on the use of threads wound around a frame arranged in layers that are illuminated by a hidden light source. A distinct *weaving* effect of subtle patterns and shadows that create

the sensation of light being threaded through space.

Also the “Knit collection” designed by Meike Harde, although not new, is one of my favourites. These pieces strike a beautiful balance: visually structured, yet emotionally warm allowing us to create sensorial and immersive atmospheres. Warm lighting doesn't only illuminate, it defines and highlights surface details. Vibia continues to lead with thoughtful design that elevates light into something almost tactile.



Rukumba's “Glow Out” – Heritage and Warmth in Wool

Rukumba presented one of the most heartfelt installations with *Glow Out*, a soft and radiant piece that pays tribute to Australian wool production and the brand's deep-rooted heritage to this land. Big glow is made from 100% locally sourced wool + bioplastic (patent pending) the installation

exuded a sense of calm and intimacy.

But this was more than a beautiful object – it was a message. *Glow Out* speaks to slow design, to material honesty, and to Rukumba's renewed dedication to ethical production and support of local communities. The light it emits is not only soft to the eyes but soft in intent: warm, grounded, and full of meaning.

Acqua Gallery – Silk, Shadow, and the Poetry of Movement

Few stands created as much visual poetry and colour, as **Acqua Gallery**. Their use of ultra-fine silk in lighting fixtures resulted in a hypnotic interplay between light and shadow. The fabric moved gently with the air, casting fluid, shifting

patterns that brought a dreamlike quality to the space. The use of soft silk on this lighting enhances our sensory responses.

It was a powerful reminder that material choice matters – not just for sustainability, but for storytelling. In Acqua's hands, silk became more than luxurious – it became alive.



Preciosa – The Sparkle of Craft, The Strength of Community

Preciosa, with its storied Bohemian crystal tradition, presented work that dazzled on the surface but resonated even more deeply beneath. What might seem like a heavily industrial production in fact cuts much deeper in its tradition.

Whilst yes, their installations shimmered with expertly cut crystal; what truly stood out to me was the brand's dedication to

preserving endangered craftsmanship and supporting local communities in the crystal Valley of north Bohemia. Preciosa has also made strong sustainability commitments: reducing water use by 50% since 2010, creating lead-free crystal, and launching their *RE/nventory* program – donating unsellable products to design students to reduce waste and nurture talent. They don't just make chandeliers; they sustain a legacy, one that's rooted in people, not just products.

JUNICHIRO YOKOTA STUDIO

At the Salone Satellite I often discover intriguing new talent, this year I came across the work of Junichiro Yokoto, a young designer from Japan whose creations left a lasting impression. Yokoto's practice is rooted in sustainability and a deep respect for local craftsmanship – values that resonate principles of biophilic design.

One piece in particular stood out: *Kaleido*, a table lamp unlike any I've seen before. While recycling plastic into eyewear is familiar territory, Yokoto takes a wholly unique approach by upcycling discarded optical lenses – the actual glass from used eye glasses – into something entirely new. The name *Kaleido* draws from the Greek *kalos* (beautiful) and *eidos* (form), suggesting transformation and impermanence –

a fitting reference to both the material and the process.

The reused glass is pre-treated to a pebble-like shape, and after nearly a month in the kiln, the disparate pieces are re-formed to form a single piece. The pattern created during this process varies according to the size of the material, the temperature setting and the way the glass melts, so the pattern is never the same. The result is a fantastic, one-of-a-kind glass lighting.

Discovering *Kaleido* was truly a moment of awe. It reminded me of how design continues to surprise and inspire, especially when innovation meets sensitivity to materials and meaning. It's heartwarming to see such poetic transformation in everyday waste – and for me, this lamp captures exactly that magic.

**A Light-Filled Future**

EuroLuce 2025 wasn't just about light – it was about everything light touches: craft, culture, emotion, and environment. From the quiet contemplation of *Library of Light*, to the tactile beauty of *Vibia*, the warmth of *Rukumba's* wool, the floating softness of *Acqua Gallery*, the shimmering responsibility of *Preciosa*, and the awesome discovery of *Kaleido* – what stays with me is that glow – not just from

the lamps and installations, but from the stories behind them and the efforts some manufacturers are making to shift towards more responsible production.

Odile Smith, *Global Sourcing Director for the Journal's Biophilic Design Sourcing Hub*. Visit the website to source biophilically rated product with sustainable credentials.

www.biophilicdesignsourcinghub.com

Sensory Artistry, Light and Wellbeing

“In the world of art, light is not merely a means of visibility - it is an active and essential participant in the experience of any artwork. Giles Miller Studio was founded in 2011 by Giles Miller, a British artist who works in surface, structure, and sculpture. Artworks should exist in perfect harmony with their surroundings, adapting to the perspective of the viewer and the ever-changing play of light throughout the day.”

Giles Miller

Light, whether natural or artificial, influences the way an artwork is perceived. Shadows, highlights, and reflections breathe life into the composition, creating a dialogue between the piece and its environment. We see light as a collaborator, shaping and evolving the way our works are experienced over time. It is this dynamic interaction that allows our work to transcend static form, becoming something that is felt as much as it is seen.

Another cornerstone of our creative process is the incorporation of natural materials. The composition of natural materials such as wood, metal, or ceramics brings an inherent sense of calm and grounding to the viewer. These materials, when carefully and considerably composed, interact beautifully with light, casting dynamic shadows and subtle shifts

in tone that change with the passing hours. This interplay between form, material, and illumination contributes to an artwork that is not static but fluid - an evolving visual and emotional experience.

Beyond materials and light, our studio's approach is rooted in the arrangement of elements in a manner inspired by the fractals and biophilia found in nature. We often compose our works from masses of components, allowing nature's influence to guide us in shaping them into cohesive, rhythmic patterns. This careful orchestration creates a sense of movement and depth, offering the viewer an emotional lift. The combination of organic materials, structured composition, and the vital role of light enhances the immersive quality of our artworks, making them more than just objects - they become experiences.



LIGHT

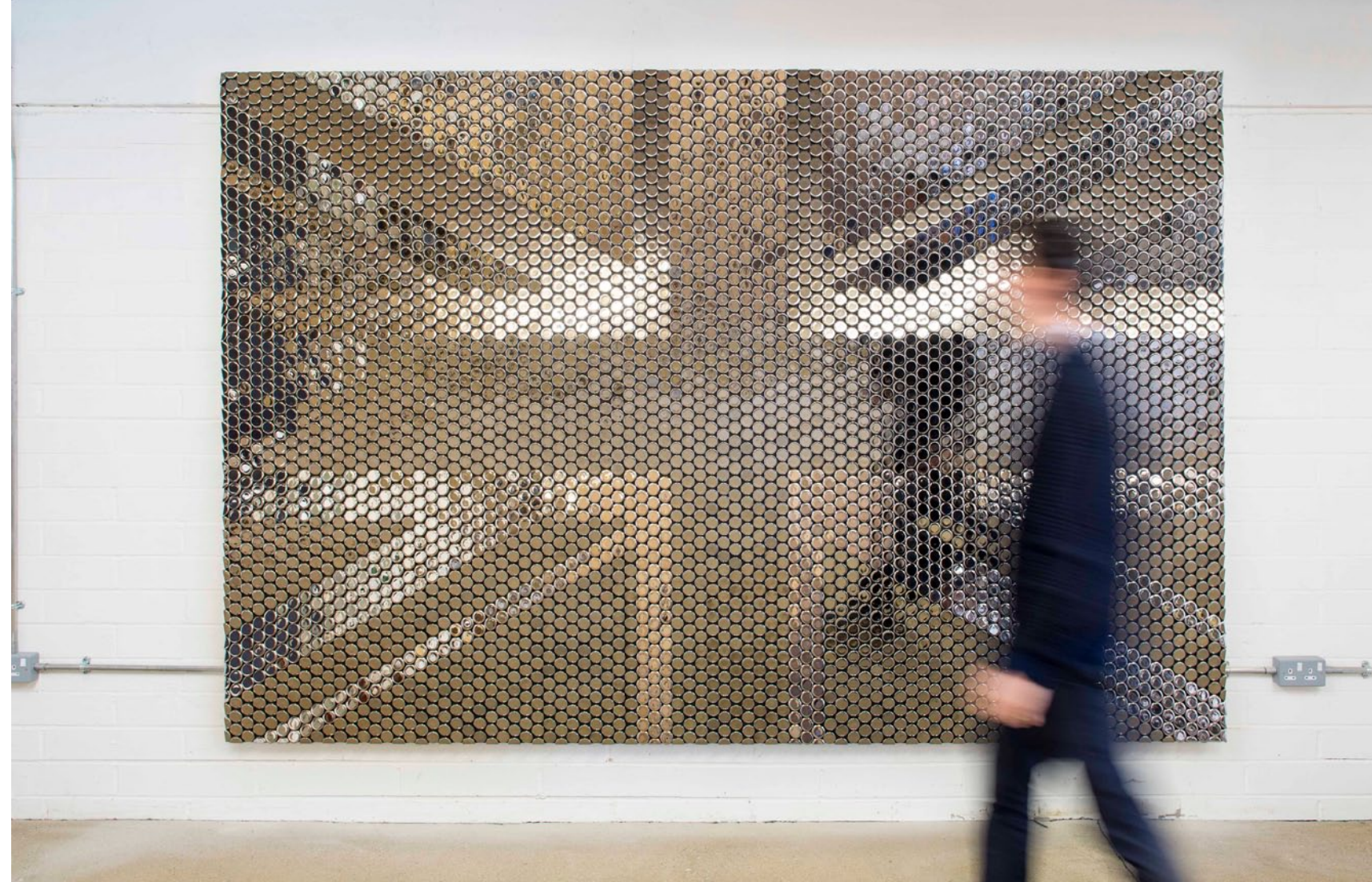
Artistic purpose, at least within our own studio's practice, extends beyond form and aesthetics – it is about the human experience. Neuroscience has proven art's ability to promote wellbeing, validating our mission to create works that positively impact those who engage with them. Art has the ability to communicate with and unite our senses, evoking emotions ranging from pleasure and awe to comfort and serenity. This sensory impact is something we study, channel, and perpetuate through our work. We call it *Sensory Artistry*.

Our artworks are designed to heighten awareness of the surrounding environment and one's own emotions. Through careful composition, natural materials, and the transformative power of light, we create immersive experiences that go beyond visual appreciation. Light is the force that

breathes life into these compositions, altering their appearance and emotional resonance throughout the day.

This dynamic relationship between light, material, and structure is what makes our work effective in fostering wellbeing. By designing artworks that evolve with the light, we encourage moments of reflection, tranquillity, and emotional upliftment. Just as natural light shifts with the seasons, our works respond to their environment, forming a living, breathing connection between art and its audience.

Ultimately, light is not just an external factor – it is an intrinsic force that transforms and elevates our experience of art. Through sensory artistry, we seek to harness this power to create artworks that are not only visually captivating but deeply enriching to the human spirit.



It follows that the significance of light extends far beyond the realm of art. It is a fundamental consideration in any designed space – whether architectural, interior, or landscape design – where the goal is to foster a sense of wellbeing. The same principles that guide our work in the studio – harmony with the surroundings, interaction with changing light, and the emotional resonance of materials – can be applied to all environments where people live, work, and gather.

A well-designed space that thoughtfully integrates light can transform mood, enhance focus, and promote relaxation. Natural light, in particular, has been shown to improve mental health, increase productivity, and establish a deeper connection between individuals and their environment. Architects,

designers, and urban planners must recognise light as more than a functional necessity; it is a medium through which space is activated and experienced.

By embracing the power of light in our surroundings, we can create environments that uplift, inspire, and heal. Whether through art, architecture, or design, light remains a fundamental force – one that shapes our emotions, our interactions, and ultimately, our sense of wellbeing.

www.gilesmiller.com

Photography credits:

Billboards – Richard Chivers

Eyrie – Olco Studios

Great – Giles Miller Studio

Woven – Edvinas Bruzas

The Veil – Olco Studios

Top tips and benefits for biophilic lighting

“Introducing biophilic lighting into workspace or hospitality settings offers a whole host of benefits for both people and the planet.”

As the number of built spaces increases, individuals are looking for new, innovative ways to introduce nature into their environment. Biophilic lighting aims to connect people with the harmony of nature and improve their wellbeing, boost productivity and enhance cognitive function.

Custom biophilic lighting solutions can harmonise the urban environment by evoking natural light patterns and elements in lighting design.

One of the ways to incorporate biophilic elements into your lighting design is

incorporate greenery and planters to bring essential elements of the outdoors inside, improving air quality and blending true nature with artificial elements. Adjusting colour temperature, lighting levels, and dimming to mimic natural lighting also boosts overall health and well-being to align with our natural circadian rhythms and promote relaxation. Plus utilising natural materials and earthy tones, such as wood, stone and glass not only matches the environmentally friendly aesthetic but further enhances sustainability and reduces carbon footprint from the production and waste of synthetic materials.



By mimicking natural light patterns and regulating our circadian rhythms, biophilic lighting promotes better sleep cycles, reduces fatigue, enhances mood and boosts productivity. The natural lighting levels reduce eyestrain, headaches, and stress levels, improving concentration, creativity and immunity.

Another key benefit of biophilic lighting is its energy saving ability - with advanced lighting control systems, the lighting is programmed to automatically dim or switch off in relation to building or room occupancy. This creates a more energy-efficient system which makes the most of natural lighting and daylight harvesting, resulting in significant energy savings and a reduction in the building's carbon footprint.

<https://pandaprojects.co.uk>

Image credit:

'Images courtesy of P&A Projects'



THE ART AND SCIENCE OF NATURAL AND ARTIFICIAL LIGHT IN ARCHITECTURAL DESIGN

Steve Edge

“From ancient oculi to cutting-edge biophilic design, this piece uncovers how architects harness light and shadow to shape our spaces, elevate wellbeing, and even help plants sleep.”

When I think about buildings, that use natural light to define the interior, the first one that springs to mind is the Pantheon in Rome with its 8m+ diameter Oculus (hole) in the ceiling. Remodelled in 1stc AD by Emperor Hadrian, it provides a portal to the heavens, and the only natural light source to the interior. <https://accademiastudioitalia.com/the-mysterious-oculus-of-the-pantheon-a-hole-to-heaven>

Another one is the London home of 18th-19th Century British architect, Sir John Soane, who's often referred to as 'a sculptor of light'. His former home is now a museum to his work and collection of classical architectural details. He greatly admired the classical architecture of Rome, and also the atmospheric paintings of 19thc UK artist JMW Turner, and the fantasy etchings of Piranesi.

However, darkness is equally important as light in defining spaces, according to Japanese author Junichiro Tanizaki in his book, 'In Praise of Shadows'. This is wholly evident in Le Corbusier's Chapel, Notre Dame de Haut, Ronchamp, France, where the *chiaroscuro* effect of the morning daylight falling onto the alter, signals the start of morning mass https://thearchspace.com/8-fascinating-examples-of-natural-light-and-shadows-as-architectural-concepts/#6_Zollverein_School_of_Management_and_Design



The first time I really understood how to design with artificial light, was when I found out what Lux Levels were and why they were needed. This was when I worked for London based Interior Designers, David Leon and Partners in 1982-3, as the Lead Designer for their client Citibank, then the largest bank in the world. I built up a team of 14 to design the interior of their new workplace, for over 1,000 people. In what was a triangular shaped, £8 million structural courtyard infill and a £3 million interior project, facing directly down The Strand, from The Aldwych, in Central London, UK.

With a 'Deep Plan' space and very few windows, my lighting design strategy for the period was very sustainable and progressive. Comprising mainly of High Intensity Discharge lamps in uplighters (HID – think streetlights), as one uplighter provided the same amount of light as half a dozen 1200mm x 600mm recessed fluorescent modular fittings. We designed a layout where these very powerful uplighters were placed in a 2m square spaced floor grid, reflecting off the ceiling, and providing 500 Lux down onto the working plane, and 250 Lux into the circulation areas. At the time the colour rendition of HID lamps, was the closest to daylight that was available.

There's always something new to learn about lighting, as I found out recently when my lighting designer colleague Mary Rushton Beales, Managing Director of Lighting Design House, introduced me to the concept of photomediation, i.e. controlling lighting to allow plants to sleep at night. Mary designed the indoor planting lighting scheme for The Spine, Royal College of Physicians new HQ in Liverpool, UK, by Manchester based architects AHR. Which I was biophilic design consultant for, it opened in 2021 and is destined to become one of the healthiest buildings in the world. We also worked together on research in Lockdown, to find the best UVC light fittings which would kill Covid 19 in the interior.

However, I feel we can't talk about light in architecture without considering all the other senses as well, as each are linked holistically. Although, perhaps this is something for another article?

www.salvedge.co.uk

For more information and examples of the uplight and downlight concept <https://www.warehouse-lighting.com/blogs/lighting-resources-education/what-is-uplight-and-downlight>



Balancing Brightness and Silence

Three ways to align Lighting with Acoustics

Charlotte Trudgen

Designing for high ceilings requires more than aesthetics – it's a balance of form, function, and human comfort. Exposed services and open volumes often create problematic acoustics, but integrating high-performance solutions like Class A acoustic rafts or PET felt panels can significantly reduce reverberation across a range of frequencies. When paired with carefully considered lighting – whether integrated linear fixtures, sculptural pendants, or soft ambient glows – these

treatments do more than manage sound; they enhance wellbeing, support focus, and elevate the spatial experience. By blending acoustic science with visual storytelling, designers can craft interiors that are not only beautiful but healthier and more attuned to how people feel and function within them.

So how can you incorporate them as a designer? Here are some examples that we use.

Journal of Biophilic Design

LIGHT

High Ceilings

High ceilings and exposed services often create echo and reverberation. This makes it difficult to balance lighting with effective acoustic treatments.

The shape, size, quantity, and type of acoustic finishes all influence performance. Class A fabric-wrapped rafts and baffles offer top-tier sound absorption across a wide range of frequencies and volumes.

When acoustic and lighting elements

are thoughtfully combined, they can harmonise or contrast to striking effect. A linear setup might use Class A panels or PET acoustic felt, with lighting either integrated or running between acoustic pieces.

For a more playful approach, try mixing forms. In the featured project, regularly spaced circular printed rafts are paired with irregular linear stick lighting, creating visual interest through contrast. (See also the section on atmospheric lighting).



LIGHT

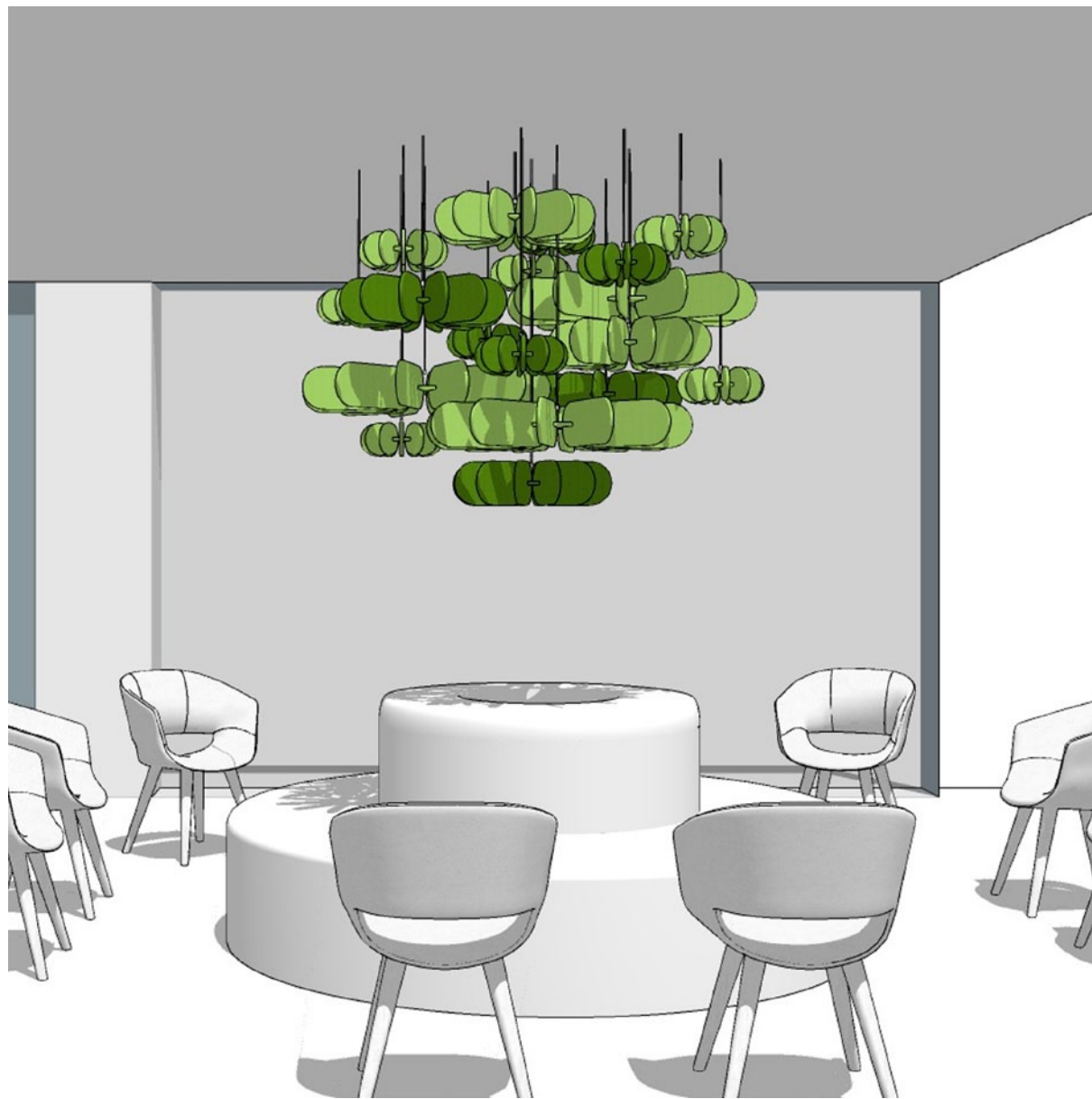
Statement Lighting

In commercial and public interiors, decorative or statement lighting is sometimes needed to create a focal point or feature, though integrating it with acoustic solutions can be challenging.

Suspended sound-absorbing forms – such as acou.space's SOLIS light shade – can be grouped centrally, with pendant

lights fitted to some but not all of the shades, creating visual interest while helping to manage acoustics.

Similarly, evenly spaced single pendant fittings above a meeting table or reception desk can reduce reverberation and simultaneously add a refined decorative touch.





Atmospheric Lighting

To create atmospheric lighting, consider spotlighting suspended acoustic felt panels positioned above textured designs – such as v-groove patterns or acou.space’s RELEAF, BUZZWIRE and CURVE forms.

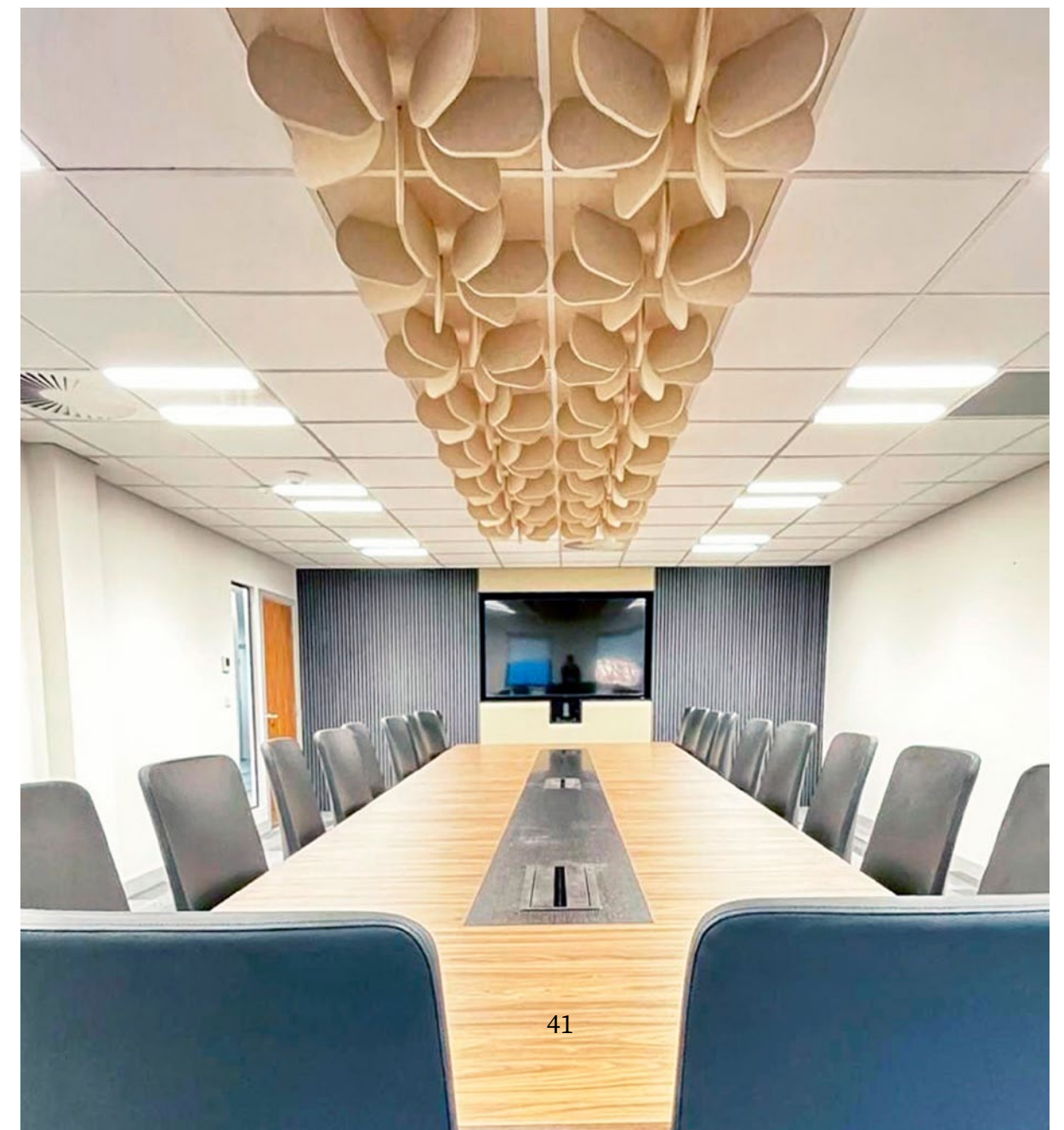
This approach highlights form, pattern and blocks of colour, whether tonal or bold feature shades, and can produce a striking visual effect.

Alternatively, fitting lighting strips to the top surface of shaped suspended rafts

creates a soft, reflected glow, delivering ambient light with minimal glare for a calming, atmospheric feel.

With a background in woven textile design and over six years’ experience as an acoustic designer, Charlotte Trudgen is the founder of acou.space, an acoustic design studio based in Leeds. Prior to launching the business, Charlotte worked in commercial interior design, specialising in public spaces.

www.acou.space



The Enigmatic Mystery that is Light...

“What is light? Light is neither particle nor wave, but both, standing in its own unique category of matter. Thus, it is both invisible and immaterial, and yet without light, the universe as we know it would be imperceptible...”

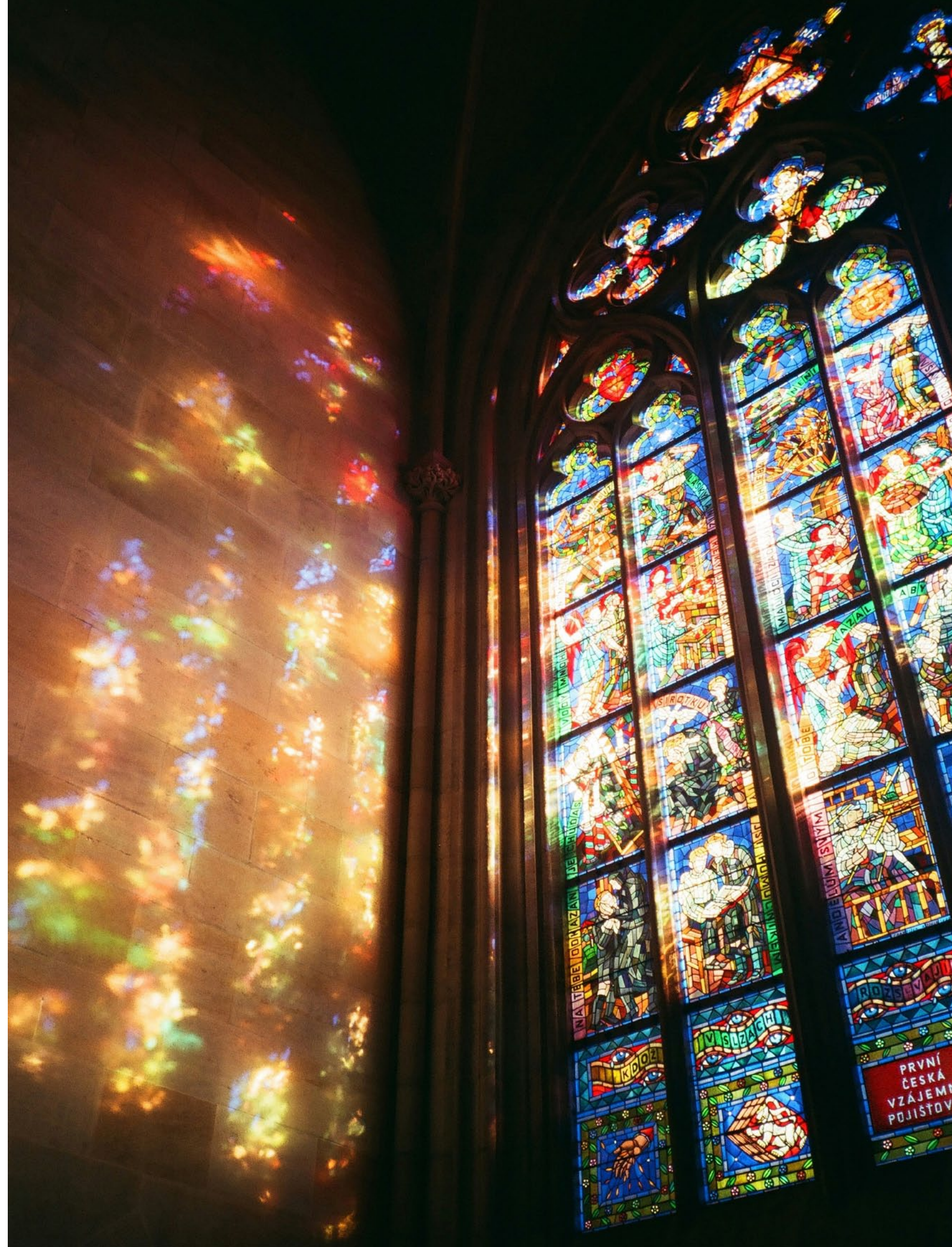
Boon Lay

At the heart of the edifice we call science is an enigmatic mystery that is, at the same time, the very foundation and explanation of the universe as we know it – light. Light is more than just the visual colours that we can see but exist as part of an electromagnetic spectrum that permeates the universe and spans across an astounding range of wavelengths, from more than 100 kilometres in length in the longest radio waves to less than 0.01 nanometres in the shortest gamma rays. It is pure energy, and light was the first force to emerge at the beginning of the Big Bang. Light didn't just illuminate the universe; it was, in fact, the substance from which all things emerged.

In everyday life, energy, defined scientifically as the ability to do work, requires an object to do the work. This relationship is reversed in the making of the universe. Energy, in the form of photons, collide to form matter. In

everyday life, we see this creativity when we melt and combine metals and other matter, or when we cook our food, making bread from flour. Respiration, the process through which food is converted to energy, may be regarded as a form of combustion, a gentler, more efficient, form of fire.

We see light at its source and when reflected off objects, revealing both the source and the illuminated form, but we do not see light itself. Shine a torchlight into the night and you can see its path only if there are enough dust particles to scatter it. Light is neither particle nor wave, but both, standing in its own unique category of matter. Thus, it is both invisible and immaterial, and yet without light, the universe as we know it would be imperceptible. In many ways, light defies our everyday understanding of reality – for instance, its speed remains constant regardless of the observer's motion. And yet, our very perception of reality is fundamentally shaped by light.





The ancient mind is able to appreciate the mystical quality of light and perceive it as something special, something sacred, without these scientific insights. Across numerous traditions, light has been worshipped as a life-giving force, symbolizing divine presence and cosmic order. The harnessing of fire 1.5 to 2 million years ago is one of the most, if not the most, critical turning points in the history of our civilisation. Without fire, the harvest of food would mostly go to waste. The ability to create our own light and to use that light to transform death into food, protect us from predators, and forge weapons, marked both the dawn of human civilization as well as warfare, conquest and subjugation.

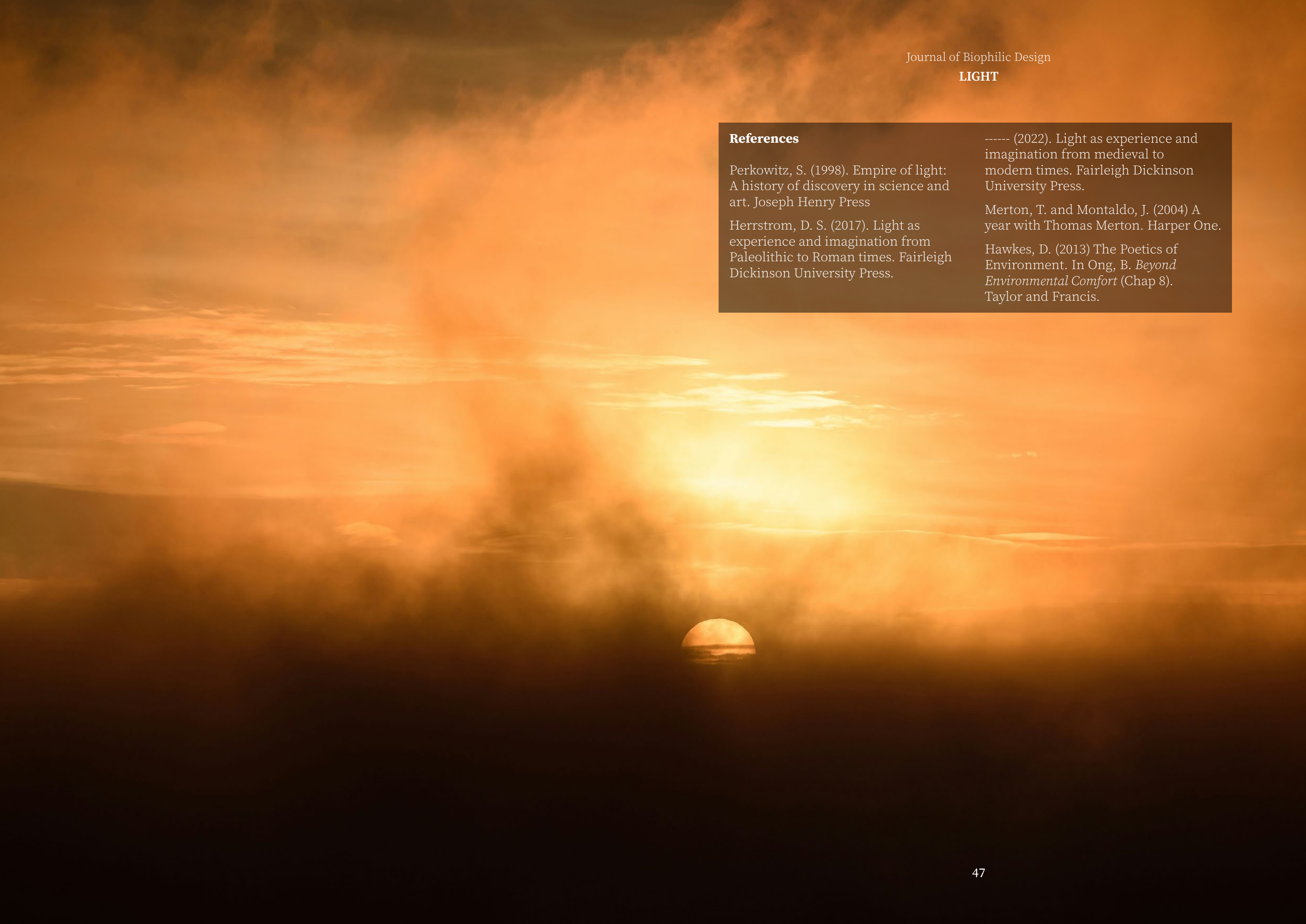
We may be inured to the magical qualities of light, but our bodies aren't. Thomas Merton describes sunrise as "*an event that calls forth solemn music in the very depths of one's being, as if one's whole being had to attune itself to the cosmos and praise God for a new day*". We feel this uplift ourselves, when we greet the morning sun, feel the cool dewy air, and bask in its gentle light. Deprived of it too much and it becomes a disorder. Caught in the timelessness of artificial light, not knowing whether it is day or night, our bodies maladjust and we may become insomniac, unable to sleep because our bodies were deprived of the calming effects of darkness. It is good practice to wake up each day to greet the sunrise and to repose when night falls. For the rising of the sun and the emergence of the new day energises and renews the body just as the losing of light tells our bodies to rest.

Light in architecture is far more than a tool for visibility; it shapes space,

influences emotions, and carries spiritual meaning. From ancient temples to modern skyscrapers, architects have harnessed light in fascinating ways to create depth and drama, bringing to life an otherwise inert object and creating transparencies that link the inside to the outside. It is no surprise then that natural light is manipulated in architecture not just to enhance the functional and the aesthetic qualities of a space, but to raise it to spiritual heights. Skylights, windows, and other openings filter sunlight, creating animated patterns that connect us with the otherwise unseen world outside – day and night, sun and rain, across the seasons. In Gothic cathedrals, stained glass windows transform daylight into kaleidoscopic colourful vignettes, bringing to life Holy lessons, while in Islamic architecture, intricate mashrabiya screens soften the harsh sun, providing sanctuary. Perhaps the most impressive of this manipulation occurs in the Church of the Light by Tadao Ando, where he manifested the Christian cross with light, making light substance and substance void.

It is often claimed that science and our Modern age has removed the magical and the miraculous from our lives, and if it has, our mental health has suffered as a result. But science has also opened up new insights into reality and the universe is perhaps even more magical and miraculous than previously perceivable by ancient minds. We need to avail ourselves of this source of energy and approach the universe with awe, humility, and reverence.

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Biophilia & Light: Getting the Right Balance

“Through millennia of evolution, we have instinctively followed the rhythms of the sun, building shelters to temper nature’s extremes, but the more we shut ourselves inside we have drifted away from the life-giving dance of light and darkness. Biophilic Design strategist and Building with Natureⁱ assessor, Victoria Jackson help built-environment professionals create spaces that blur the boundaries between indoors and out, fostering year-round connections with nature through climate-responsive and seasonal design.”

Victoria Jackson

There is now a greater understanding of how both the quality and quantity of light we are exposed to can affect our circadian rhythms (our internal body clock that regulates many of our bodily functions such as hormone release and sleep-wake cycles). Research into these biological cycles has led to the creation of some fantastic lighting systems and technologies that can help regulate our sleep, helping improve mood and physical wellbeing so that we can function in our ‘always on’ cultures.

But what if, rather than relying on artificial lighting to fix our circadian rhythms while overriding the local and seasonal cycles of light and dark, we asked some more fundamental questions about our lifestyles? We know by now that on average we spend more than 90% of our time inside and that our disconnection from ‘nature’ (the other living species and living systems on our planet) is having a detrimental effect on both human and planetary wellbeing. So, how did we get here?

Throughout our evolutionary development humans have sought then created shelters to protect us from the elements. As these have become increasingly sophisticated, they have further shut nature out. As a biophilic design strategist and *Building with Natureⁱ* assessor I have been trying to reverse this trend and help built-environment professionals to incorporate beneficial nature connections in our urban environments. Softening the boundaries between interior and exterior spaces has always been fundamental in the design guidelines I create for clients; introducing structures and planting that can facilitate occupants being outside more of the time, throughout the seasons. This means different things for every climate and requires a place-based understanding of seasonality and the changing weather patterns.

When creating this blurring of indoor and outdoor spaces, it is important to think beyond the human centric understanding of circadian rhythms and to consider how our 24-hour lifestyles and lighting systems affect the other species who share our cities and neighbourhoods. Where I live the local football stadium turns lights on at night to help the grass growing on the pitch (which is also underfloor heated), creating an orange glow in the sky. This nighttime anomaly not only confuses residents and visitors, who wonder why there is an elongated sunset in the wrong direction, but also the sleep-wake cycles of other species with

habitats in the nearby nature reserve.

Dark Skyⁱⁱ have been campaigning for years to reduce light pollution and minimise its impact on wildlife. Their work ranges from creating education programs and research to conservation of starry sky areas and certification of lighting products and systems that reduce light pollution. There are now more than 200 International Dark Sky Places (IDSP) around the world, with Flagstone, Arizona becoming the first Dark Sky City in 2001. Dark Sky principles for responsible outdoor lightingⁱⁱⁱ are great guidance for those of us trying to create biophilic cities in which we encourage bio-diversity and create healthy habits for more than just humans. They encourage using light only if it is needed and directed, light no brighter or longer than is needed, as well as minimising the use of blue lights, most of which are also good considerations for interior spaces.

Thinking beyond a human-centred approach to biophilic design requires a shift in mindset regarding who we consider as stakeholders in our design projects and advocating for the other species who do not currently have a seat at the table. This was a recurring theme in conversations with specialists when I was writing ‘Life-Centred Design – Designing a world where all can thrive’^{iv} with Interface, Inc. and Oliver Heath Design for publication last year.





When it comes to light, biophilic design therefore has several challenges: how to encourage people to access more of the available natural light and ensure artificial lighting is not detrimental to occupants, neighbours or other species. Additionally, considering the wellbeing of other species requires getting the right balance between the human need for protection from the elements, security through adequately lit spaces, and enabling life to thrive without over-stimulation due to artificial lighting.

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Also check out the podcast we did with Steve Tonkin, on why we need Dark Skies for our physical and mental health as well as the health of other life we share our planet with:
<https://journalofbiophilicdesign.com/podcast-journal-of-biophilic-design-right-light-right-place-right-time>

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- i <https://www.buildingwithnature.org.uk>
 - ii <https://darksky.org>
 - iii <https://darksky.org/resources/guides-and-how-tos/lighting-principles>
 - iv https://www.interface.com/content/dam/interfaceinc/interface/publications/brochures-collateral/global/life-centered-design/LCD%20Guide_EN-US_WEB.pdf

Light through Nature's Eyes

An artist's exploration of light as a living force, shaped by nature, driven by design, and crafted to transform how we feel and connect

Lilian van Daal

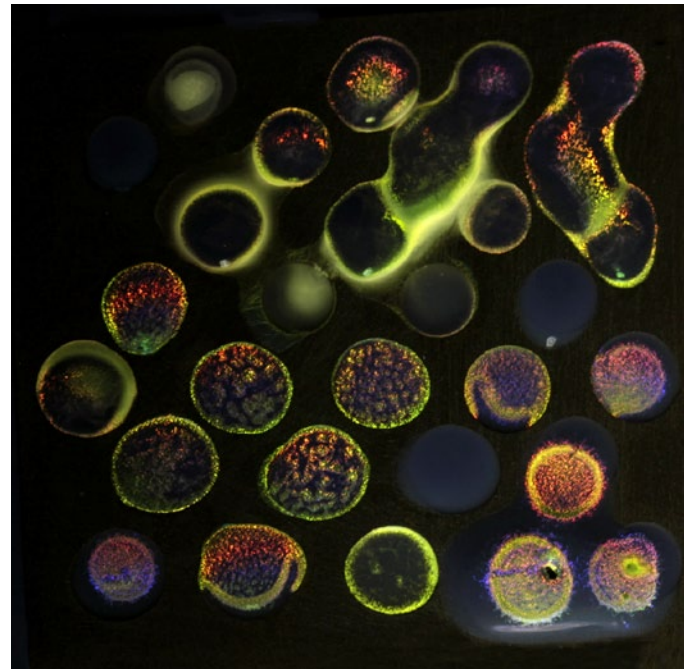
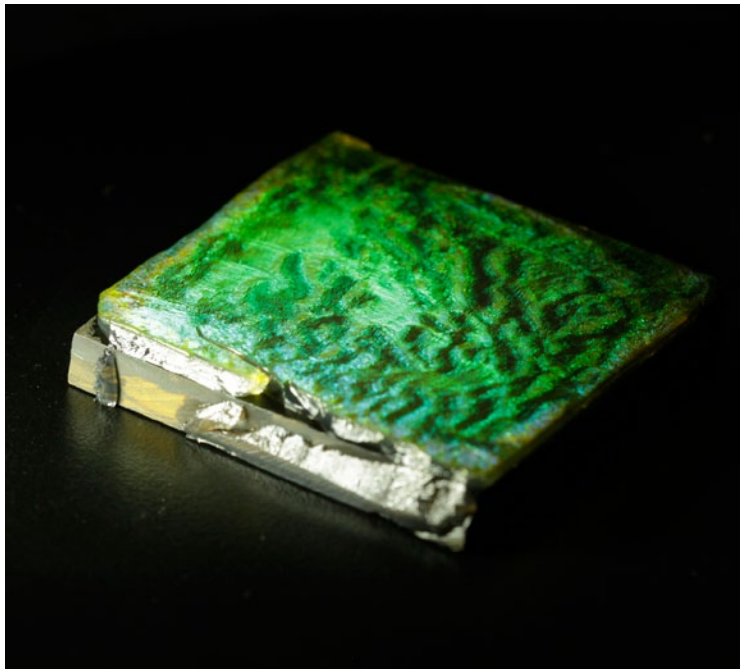
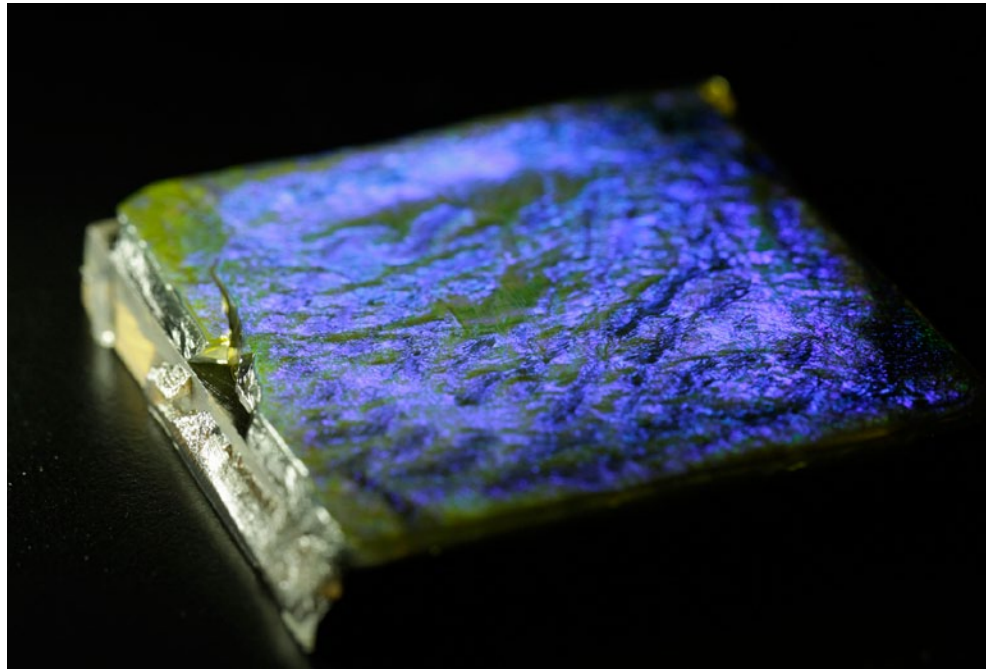
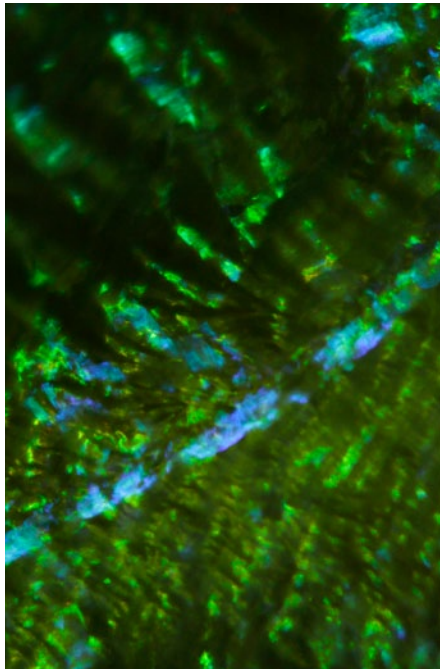
Light is not merely a technical element, it is a living, sensory material that shapes our experiences. In nature, light drives growth, movement, rhythm, and behaviour. In design, it has the power to influence how we feel, connect, and inhabit spaces. As a designer working at the intersection of biomimicry and biophilic design, I approach light not just as illumination, but as an ecosystem of interaction and inspiration.

Biomimicry invites us to observe how life has evolved to use and manipulate light. Reading *The Optics of Life* by Sönke Johnsen opened my eyes to how light behaves in natural systems, from its physical properties to its biological significance. It reinforced the idea that nature is not only beautiful but profoundly functional in its use of light. This insight now informs much of my creative process.

One project I'm working on is **structural colour**; a phenomenon where vibrant hues arise not from pigments, but from microscopic structures that refract or reflect light. Found in butterfly wings, beetle shells, and bird feathers, these nano-patterns create shimmering, colour-shifting effects. Inspired by this, I've begun a collaboration with Hoekmine B.V., who work with structural colour bacteria found in nature. These bacteria produce vivid, angle-dependent colours using nanostructures rather than dyes. I am exploring the potential to integrate these living systems into materials and products, which opens the door to more sustainable, toxin-free colour in product and interior design, colour that is dynamic, biodegradable, and deeply alive.



LIGHT



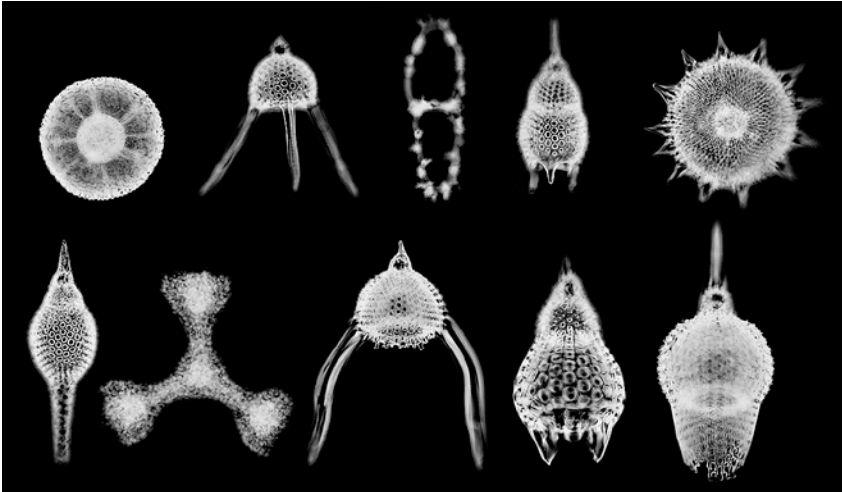
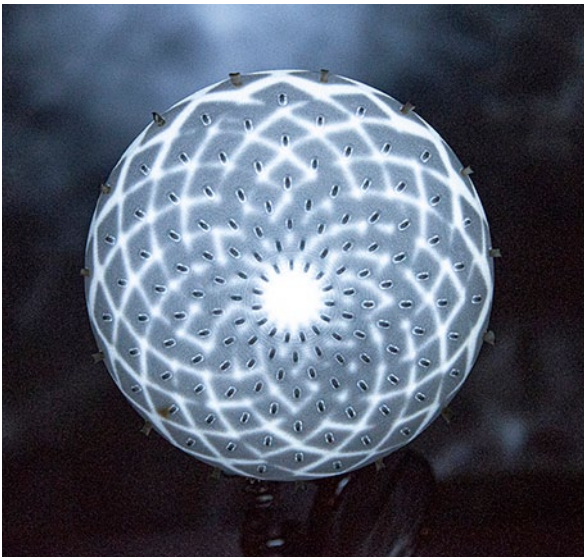
Nature's brilliance doesn't stop at colour. Fish scales, particularly in open-water species, offer another light manipulation strategy. Their reflective layers scatter light omnidirectionally, helping them remain nearly invisible as they swim.

These angle-independent reflectors offer exciting insights for responsive surfaces that adjust to light conditions throughout the day, inviting new approaches to adaptive lighting in architecture and product design.

LIGHT

Heliodiscus, is a modular light installation inspired by radiolarians – single-celled plankton with intricate, silica skeletons. These organisms use radial symmetry and thin, porous shells to scatter light in the ocean. Through *Mie scattering*, their glassy

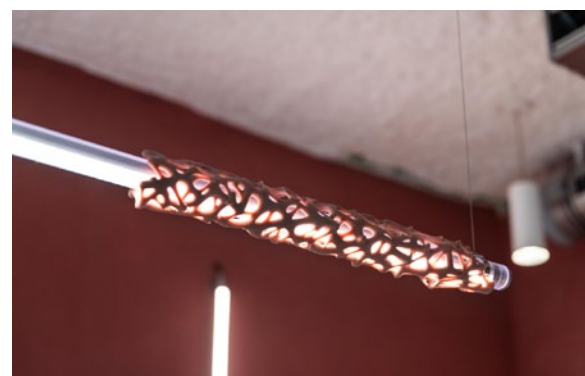
forms produce glowing, diffused light. *Heliodiscus* brings this effect indoors, casting organic patterns that reconnect us with nature's microscopic geometry. It's a celebration of radial form, light diffusion, and the poetry of ocean life.



LIGHT

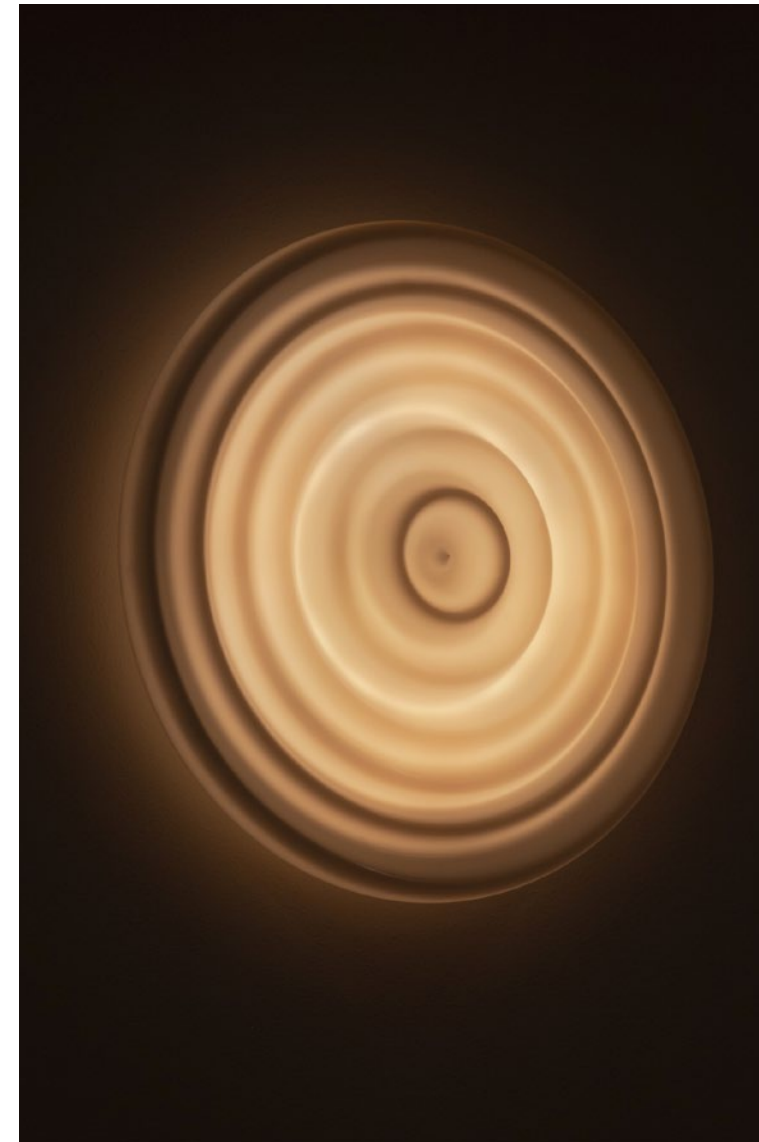
Another example is the **Bone Light**, a pendant lamp inspired by trabecular bone structures and 3D printed from recycled limestone or sand. Bones grow in response to pressure and light, forming intricate internal lattices.

Mimicking this structure, the lamp distributes light softly, creating dappled shadows reminiscent of sunlight filtering through leaves, what the Japanese beautifully call *komorebi*.

**LIGHT**

Why biomimicry in lighting does matter? Because modern lighting often flattens our experience. It's static, harsh, and disconnected from our natural rhythms. Yet our bodies are tuned to the subtle variations

of daylight – warm sunrises, bright middays, gentle dusks. By reintroducing these cues into our built environments, we support well-being, circadian health, and emotional connection.



To design light with nature as guide is to design for presence. It is a way of seeing, not only through our eyes, but through our senses, emotions, and

instincts. Light, shaped by nature's intelligence, invites us to feel alive.

<https://www.lilianvandaal.com>

Eating Under a Living Sky

A Journey of Light, Food and Reconnection

Frankie Boyle

Light is the most influential force that we have on this planet. It shapes our circadian rhythms, governs ecosystems and impacts our mood, health and emotional states in ways we are only beginning to understand. Beyond the physical, light plays a profound psychological role, creating atmosphere, evoking memories and influencing how we perceive the world around us. It is not just a functional element of our environment; it is an emotional language.

For me, light is the core of my artistic practice. It is my passion, my medium, and, most importantly, my language. My work explores the intersection between light, texture, human behaviour, and neuroaesthetics: the way our brains respond to beauty and natural patterns. Having overcome challenges with speech

and language processing earlier in life, light became my non-verbal form of communication: a tool for connection and storytelling that transcends words. The connection I found with light now influences work, I seek to create immersive experiences that invite people into a deeper, almost primal relationship with themselves, with each other and with the natural world.

In one recent project, I brought this philosophy to life through an intimate immersive dining experience, staged at St.ART Gallery in Oxford Circus. It was a collaboration with chef Hannah Musante, whose culinary artistry echoed the themes of my installation 'Biophilia' an environment designed to mirror a multitude of layers within Biophilic Design.







Suspended above the long dining table was *Biophilia*, a flowing, intertwining sculpture coated in meticulously crafted wool. The wool's texture allowed programmable moving colours to ripple richly through the form, creating a sense of connection through both materiality and light. With each course of the meal, the lighting shifted, programmed into a narrative that accompanied the storytelling of the flavours and the primal rituals of food and gathering. As guests ate, the changing light didn't just caress the space above their heads, it refracted and reflected through the cutlery, glassware and tableware, creating an ethereal, dreamlike quality that enveloped the whole dining experience.

so too did the perception of the food itself, encouraging guests to become aware of the intimate interplay between what they saw, tasted, and felt.

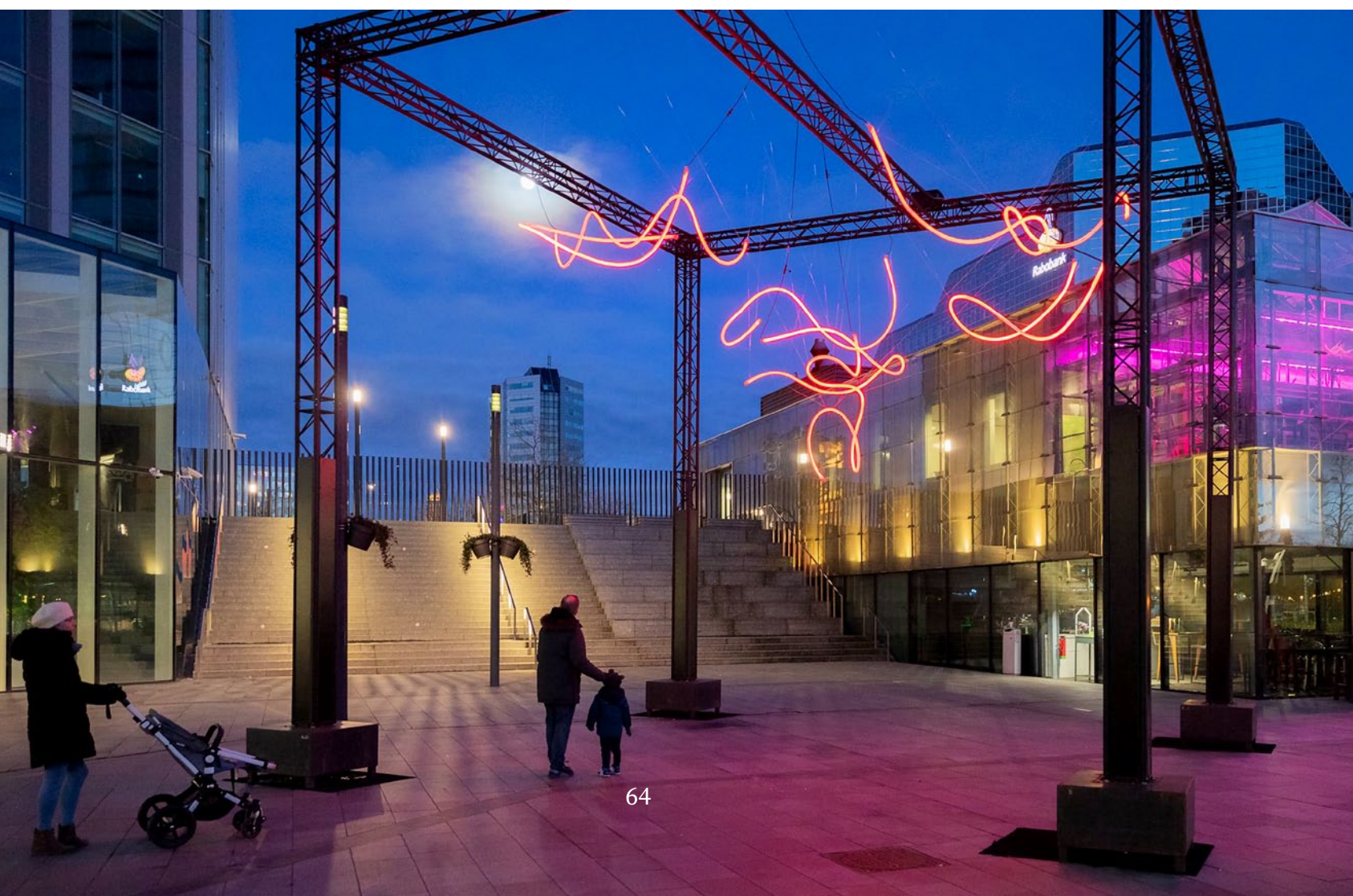
This project reinforced for me the importance of creating spaces that allow people to reconnect, not just with nature, but with their own sensory intelligence. Biophilic design is not simply about bringing plants indoors; it is about restoring the patterns and materials that our bodies instinctively understand and crave. In a world of increasing digital abstraction, these kinds of experiences offer a return to presence, a vital, nourishing reconnection to light, life and the Earth itself.

Frankie Boyle is an experiential artist using light as a universal language to explore human connection, sensory intelligence, and our innate bond with the natural world.

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Listen to the podcast we did with Frankie recently

<https://journalofbiophilicdesign.com/podcasts-journal-of-biophilic-design>



HOW CAN WE BE CREATIVE WITH LIGHTING, WHILST REMAINING MINDFUL OF ITS IMPACT?

Chiara Carucci

“Discover how thoughtful lighting design is striking the perfect balance – illuminating our nights without dimming nature’s glow.”

Outdoor lighting design holds a powerful potential: it lets us enjoy nature long after sunset. With thoughtful lighting, we create spaces that not only allow us to extend our time outdoors but also enrich atmospheres, enhance social connections, and nurture a sense of place. Whether in urban plazas, residential parks, or public gardens, well-designed lighting transforms these areas into welcoming environments where people can connect with nature and with each other after dark.

However, as we embrace these nocturnal landscapes, it’s essential to remember that our creative use of light can also disrupt nature’s delicate balance. For instance, if you choose to illuminate your garden at night, consider that plants might misinterpret the artificial glow as daylight (*especially if the light is intense or left on for hours*), throwing off their natural cycles. This seemingly harmless choice may ripple through the ecosystem, affecting not only flora but also fauna: those who’d like to sleep, or small nocturnal mammals and insects (*many are pollinators, therefore very important for us!*).

Migratory birds may become disoriented by unexpected light patterns, and nocturnal animals might miss the cues they need for foraging or mating. Even light sources that appear soft (such as red or amber) can have unintentional effects on wildlife behavior, especially on bats and other sensitive species.

In this discussion, our focus is on achieving a balance. It’s not a choice between creative design and environmental stewardship, but a challenge to design lighting solutions that extend our enjoyment of nature after sunset while respecting and preserving the delicate ecosystems that surround us.



LIGHT**DESIGNING WITH LIGHT AND SHADOW**

Let's get practical. Imagine walking past a bright bulkhead light at a garage or park entrance. You're blinded, right? This surely doesn't make you feel safe, since you can't see if someone's around or read their expression. Instead, we can design lighting to support both safety and atmosphere: highlighting entrances with a soft touch of vertical lighting that we humans need so much for orientation, and even carefully positioned lighting design that is not excessive, for paths, crossroads and other exits.

An even simpler example are small bridges and staircases where especially women often feel trapped and avoid at night, even if those are a shortcut. High poles can cast harsh shadows, create lighting barriers, and disrupt wildlife by spilling light on unintended surfaces, or into the water (in the case of a bridge). But if we place subtle lighting under a handrail, we improve visibility and create a more welcoming atmosphere, where more people will want to walk and feel safe in doing so.

And let's not forget that darkness itself is a design tool. Shadows can be sculpted. Eyes of all ages can adapt to lower light levels (depending on speed and distance) with the right design approach.

Moreover, we can decide to reconnect with nature for our wellbeing: try and take a stroll under a full moon (possibly on light gravel pavement, a snowy path or a sandy beach) you'll be surprised at how little light is needed to feel well and enjoy nature.

THOUGHTFUL DESIGN IN PRACTICE

Long-term sustainability goes beyond energy efficiency or the stewardship

of resources. It requires an integrated approach that balances environmental responsibility, social equity, and economic viability. This principle applies to lighting as well. When thoughtfully designed and maintained, lighting becomes a cost-effective investment with the potential for transformative impact, often delivering greater benefits at a lower cost than other infrastructure interventions. Moreover, thoughtful lighting design not only enhances visibility but also becomes a powerful tool to support the social cohesion and stimulate the nighttime economy.

Lighting affects far more than just visibility, it shapes how people perceive safety, trust, and ownership in public spaces. When carefully considered, it can enhance both the attractiveness and usability of a place, encouraging longer and more inclusive use of public areas after dark. In a recent project for Eskilstuna, Sweden, I collaborated with the municipality's landscape architect to integrate lighting as part of a broader, cohesive strategy aimed at promoting social and environmental sustainability.

The site-specific design transformed Hamngatan and the MDU plaza into a vibrant community hub that merges urban amenities with natural features. Lighting was seamlessly integrated into the landscape design, emphasising ecological responsibility through choices like full cut-off fixtures and warm, minimal illumination. This approach supported visual connections between the park and its surroundings while creating a balance between safety and spatial variety. Rather than relying solely on path lighting – which can inadvertently reduce perceived safety by limiting peripheral visibility – we focused on offering both an overview and layered lighting that invites exploration and help those with different visual needs for inclusivity.



We approached the project with an understanding of the “night-time condition” and how public space usage evolves across different segments of the night. Recognising that needs change between early evening and late night helped inform a more nuanced strategy. Since LEDs are electronic, features like dimming and adaptive control are intrinsic and were leveraged to respond to these shifts in usage, as well as seasonal and ecological variations.

The use of adaptable and intelligent technologies not only contributed to energy efficiency, but also allowed the system to respond to environmental rhythms and community needs. Looking forward, we hope to integrate lighting infrastructure with real-time data, unlocking even greater potential for responsive and sustainable design.

In parallel, by creating spaces that are accessible and comfortable, lighting became a tool to support social inclusion and civic life. This strategy demonstrated that lighting is not just a technical necessity or an operational cost, but as a powerful tool that shapes how we experience and share public spaces, as well as stimulate local economies through commerce, and cultural programming-a

great shift for cities such as Eskilstuna, that hopefully will echoes in the future.

On a much larger scale, European countries now have a significant opportunity as well. With the introduction of the Nature Restoration Regulation – a vital step in restoring degraded ecosystems – it is essential to consider all aspects of the built environment that may affect natural habitats. In this context, there is hope that restoration efforts will extend beyond daytime¹, recognising that informed lighting design plays a crucial role in protecting ecosystems after dark. Sustainability doesn't stop at sunset, and it is time we develop strategies that safeguard biodiversity throughout the entire 24-hour cycle.

In conclusion, for lighting design to contribute meaningfully to long-term sustainability, it must be a mindful, collaborative, and adaptable process – one that considers the complex interplay between the lit environment, human populations, diverse ecosystems, and economic factors. This approach should be guided by evidence-based knowledge and ethical principles. It involves embracing difference and planning for complexity, rather than seeking a one-size-fits-all solution.

A PATH FORWARD

So, how do we move forward with all these complexities? In my experience, the key is collaboration. At Noctua, I provide research-driven guidance and hands-on support to help others navigate these challenges. I've had the privilege of working with biologists and conservationists, helping to protect habitats and species. It often begins with a simple call: "Hey Chiara, what about the trouts? The flamingos? The beavers?" These conversations remind me that informed design isn't just about expertise, it's about staying curious, challenging assumptions, and learning together.

Transdisciplinary projects integrating biophilic design, conservation studies, urban landscapes and lighting design are not only feasible, but also effective and successful, as demonstrated through one of my latest awarded projects, where we improved the nighttime economy

while safeguarding migratory birds, but this is a story for another time maybe.

What's exciting is the potential of emerging technologies: motion-activated sensors, adaptive lighting, and dynamic controls that respond to real-time needs. These might further balance outdoor enjoyment with nature conservation. Maybe in the future, our AI powered homes will also tell us when it's nesting seasons and protect bird's hatchlings automatically by turning off the lights that could bother them.

This dual nature of lighting serves as both an inspiration and a cautionary tale for anyone passionate about biophilic design, reminding us that our nightscapes should not only captivate the human spirit, but also respect the rhythms of the living world that shares these spaces with us.

<https://noctua.life>

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THE SCIENCE BEHIND BIOPHILIC DESIGN



THE FULL SPECTRUM OF HUMAN SUSTAINABILITY

“Human sustainability must be at the heart of environmental design, and that includes access to the full spectrum of light – including infrared – which is essential to our health, wellbeing, and the creation of truly life-supporting environments.”

Ulysse Dormoy

I’ve become increasingly interested in the idea of Human Sustainability in the wider context of environmental sustainability and the built environment, I don’t believe we are doing enough to drive human sustainability towards positive human outcomes in respect of health and wellbeing.

Human sustainability – so often eclipsed by environmental concerns – deserves urgent attention. As we shape greener cities, we’re neglecting the core of it all: people. I’ve grown increasingly concerned that we’re failing to prioritise health and wellbeing, missing the chance to create environments that truly support positive, sustainable human outcomes.

Having spent some time in conversation with Tye Farrow of Farrow Partners, an expert in salutogenic design, it was clear that applying the hypocritic oath to how we design buildings doesn’t cut it. ‘Do no harm’ simply does not go far enough, the built environment must lead the way

in supporting healthy human outcomes for the occupants. We, reportedly, spend 90% of our time indoors, and we don’t yet know what the long-term impact of this is, yet if we spend a few moments joining the dots together I believe we can develop a pretty clear prognosis.

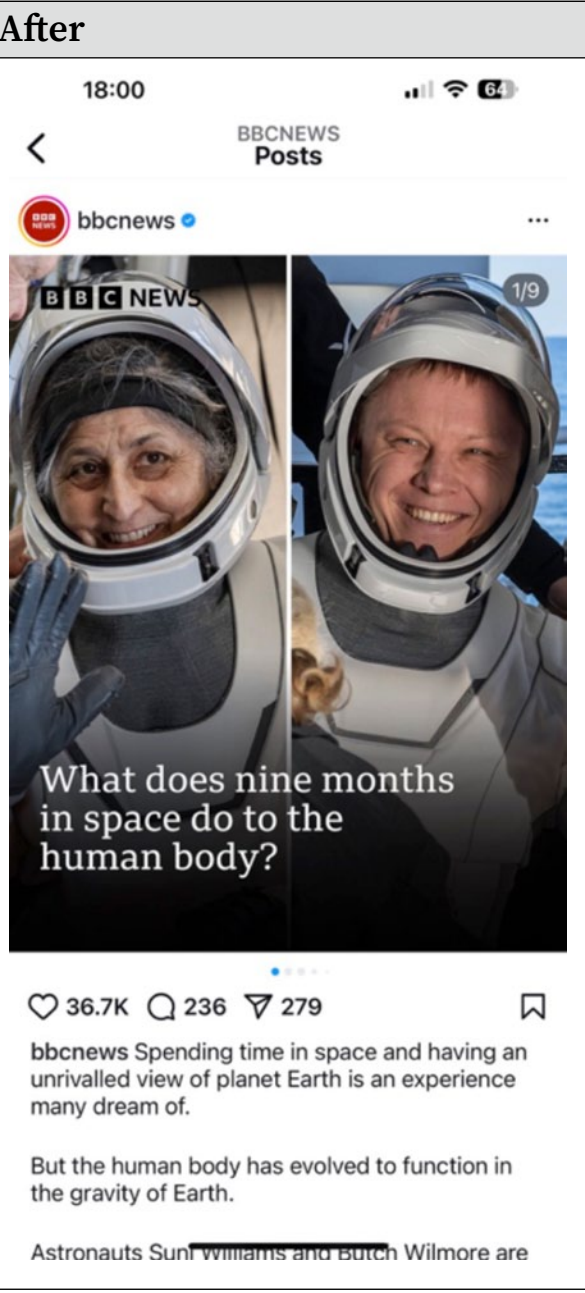
Scott Zimmerman is quoted as saying that ‘the other thing that people need to understand is that right now what we’re going through is the largest reduction in solar exposure in human history’, what is the outcome of the path we are following? We just don’t know as we’ve never been there before.

I’m writing as an advocate for quality of light, however it would be disingenuous of me not to consider the other protagonists involved in human sustainability – air, nutrition, movement and sleep. Each element plays an important role in driving our health and wellbeing, and they are all connected, the connection being our mitochondria, the powerhouses of our cells.



We live in an ultra-processed world, our movement has been reduced through extensive use of modern transport systems, the majority of the foods we eat are ultra-processed, the artificial light we receive now is ultra-processed. The air we breathe may not be ultra-processed, but it is not as clean as it used to be, and we have reduced our time asleep through artificial light and digital

devices. All the above reduces the efficiency of our mitochondrial function and maybe this is leading to accelerated ageing, not dissimilar to that seen with Suni Williams and Butch Wilmore who were stuck on the International Space Station (ISS) for 9 months, except for Suni and Butch the environmental conditions on the ISS have significantly accelerated the ageing process.

Before	After
	

Maybe this accelerated ageing is also not dissimilar to the eating fast food for a month in the same way that Morgan Spurlock did in the film Super-Size Me.

How is the built environment and our modern indoor lifestyle here on earth different to spending time on the ISS? I might suggest that it is not that different, the key difference is that here on earth we have a choice, we can choose to spend time outdoors under the full solar spectrum and maybe this choice, this small intervention is single handedly slowing down what would otherwise be a significant pace of ageing.

The Current State of Play

In the last couple of years, we've seen some quite shocking headlines....

Surge in ill health will have major impact on NHS – <https://www.bbc.co.uk/news/health-66295170>

Over 50% of adults worldwide predicted to be obese or overweight by 2050 – [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(25\)00355-1/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(25)00355-1/fulltext)

Half of the world's population could be myopic by 2050, study finds – <https://www.aaajournal.org/article/S0161-6420%2816%2900025-7/fulltext>

These are just some recent headlines, but they keep on coming, and they can't be considered as normal. Do we need to question whether we can design a better future human outcome? Could this be where Biophilic and Salutogenic design principles get adopted as standard and where quality of light is understood to be something that goes beyond being just a visual aid.

There are many factors to consider, and

it's not all about light, it is about finding the homeostasis for optimal health which is challenging when our world has been designed to optimise convenience rather than optimising performance and productivity in a physiological context, maybe it's worth saying healthy body = healthy mind at this point? Diverting a bit off topic, but staying with optimised convenience, we expect the built environment to keep us warm in winter and cooler during the summer, a modern office will range from 20°C to 24°C, this is not natural for our bodies and changes the human thermodynamic equilibrium that we have evolved with over millennia. So, spending 90% of our time indoors can significantly impact human thermodynamics in a number of ways:

- Energy Balance:** Indoor environments often lack natural sunlight, which can disrupt our circadian rhythms and affect our energy levels. This can lead to a decrease in overall metabolic activity.
- Thermal Comfort:** Indoor climates are typically controlled to maintain a constant temperature, which can reduce the body's need to regulate its own temperature. This can affect thermoregulation processes and potentially lead to a lower metabolic rate.
- Air Quality:** Indoor air quality can be poorer than outdoor air due to pollutants and lack of ventilation. This can impact respiratory health and overall energy levels, affecting how efficiently our bodies use energy.
- Physical Activity:** Spending more time indoors often correlates with reduced physical activity, which can affect energy expenditure and thermodynamic efficiency.

Overall, spending most of our time indoors may lead to changes in how our bodies manage energy, potentially impacting our health and well-being.

Coming back to how we drive optimised mitochondrial function and the role that light can play to support cellular health....

I find it interesting that we give plants energetic metrics of light, yet we give humans visual metrics of light. Light for plant growth is measured as Photosynthetic Photon Flux Density (PPFD), why? Quite simply we want the plants to be productive, whether that is on a green wall or in a greenhouse. For humans we've rather unintelligently reduced our understanding of light to being a visual aid and consequently we have reduced the indoor lighting environment to only the visible spectrum as part of the quest for energy efficiency seemingly at all costs. I'm of course not against energy efficiency and LEDs are brilliantly efficient at delivering visible light, the only problem is that as humans we need more.

All life on earth has evolved under the full solar spectrum, we've understood photosynthesis for the last 250 years, and here again somewhat unintelligently we are only now starting to understand that there is a mirror image process that takes place in living creatures, humans included. Photo-biomodulation is the term that is most often used to describe the biochemical reactions that occur in

living cells in response to light, more recently the term photo-metabolism has been coined by Robert Fosbury, Glen Jeffery, and Scott Zimmerman, to describe the interaction between light and our metabolic function. Both photo-biomodulation and photo-metabolism specifically respond to our exposure to Near-Infrared Light (NIR), the wavelengths of light that were deemed to be inefficient and as such removed from our modern artificial light sources in the quest for ever increasing lumens/watt.

It's not just our energy efficient artificial lighting that is driving our NIR exposure down. Modern glazing systems have been designed to block the infrared wavelengths to reduce solar heat gain into buildings and reduce the energy required to cool a building through HVAC systems. Here again, I am not against energy efficiency or environmental sustainability, however we do need to find the right balance so that environmental sustainability and human sustainability can dovetail together seamlessly.

A simple intervention here could be to install uncoated glass on north facing facades of buildings and then introduce soft landscaping to allow plants to reflect infrared back into the building. The image below is courtesy of Robert Fosbury and was taken with an infrared camera and shows how plant life reflects infrared. Plants don't want loads of IR so they reflect most of it back and we can make use of it.



Photo Credit: Robert Fosbury

Maybe our continued drive for energy efficiency is having a counter-productive impact on the health of nations. Could the re-introduction of the longer wavelengths of light, the ones that were deemed inefficient as they were not visible to the human eye, be used as a prophylactic intervention to reduce the growing burden of major health issues in the UK and equally across the world? There are enough scientific studies that show that using NIR can support healthy human outcomes, but this is using NIR to support recovery after the fact, why not use it in a preventative context? Here are some recent studies....

Light stimulation of mitochondria reduces blood glucose levels – <https://onlinelibrary.wiley.com/doi/full/10.1002/jbio.202300521>

Photobiomodulation therapy (red/NIR LEDs) reduced the length of stay in intensive care unit and improved muscle function: A randomized, triple-blind, and sham-controlled trial – <https://onlinelibrary.wiley.com/doi/10.1002/jbio.202300501>

Photobiomodulation for Alzheimer's Disease: Has the Light Dawned? – <https://www.mdpi.com/2304-6732/6/3/77>

Conclusion

Is it time to re-introduce near-infrared light back into the built environment? I think so. There seems to be enough evidence to suggest that our physiology needs it, it is a fundamental component that supports a variety of processes in the body.

The optimal solution, as an artificial light source, might be to bring back the tungsten filament lamp as a thermal emitter of infrared light. Of course, tungsten filament lamps were hopelessly inefficient at delivering visible light, yet simply brilliant at delivering copious amounts of infrared light across a broadband of spectral wavelengths.

Back to reality! I don't think anyone is going to support a return to tungsten filament lamps. NIR LEDs do exist and can be used to support the concept of human sustainability. The current scientific consensus seems to be converging on 850nm as being an optimal wavelength for healthy human outcomes. It is worth noting that NIR LEDs are narrowband emitters of infrared when compared with a tungsten filament lamp, my thoughts on this is that something is better than nothing.

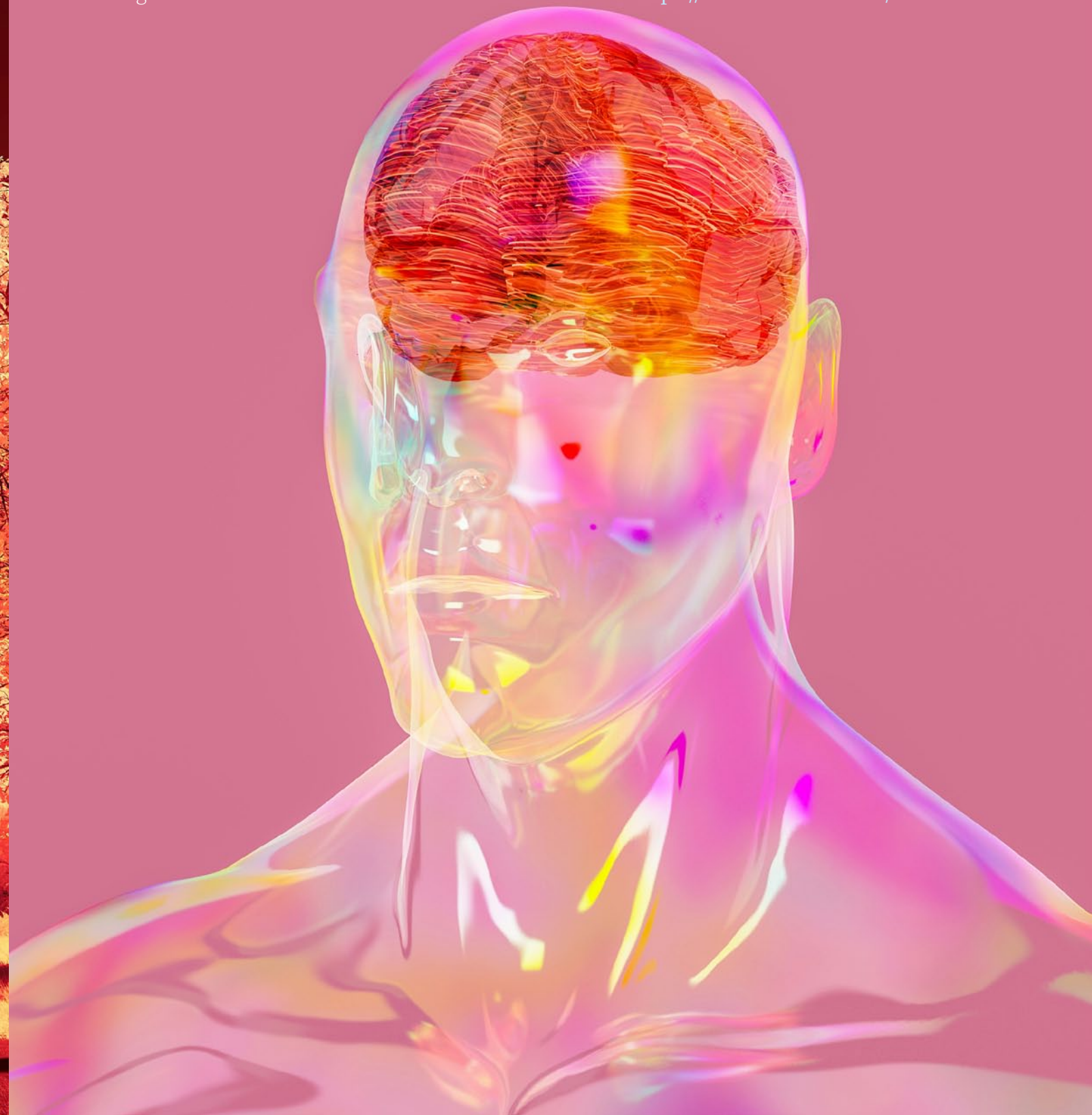
Thinking back to Scott Zimmerman's quote, we've never gone down this path before, how much more evidence do we need before we consider implementing a very simple intervention to our indoor environments?

Let's not forget that the best things in life are free, and that all life evolved under the full solar spectrum, so why not make a concerted effort to get outside every day in the morning, after lunch, whenever you can, give yourself the time to consume all the wavelengths from the sun sensibly. At the same time maybe we should also bring back some NIR indoors as I don't believe we are going to reverse the time we spend indoors any time soon. We've become known as the indoor generation for a reason.

In our industry we know a lot about lighting, but how much do we know about light, and how much should we know about light?

Light is so much more than meets the eye!

As part of the RIBA CPD Providers Network, ATRIUM deliver free RIBA certified CPD seminars to grow awareness and comprehension of the subject of light. To find out more visit <https://www.atrium.ltd.uk/the-lab>



DAYLIGHT AND BIOPHILIA IN THE WORKPLACE

“Why dark offices and windowless meeting rooms might be making you tired, moody, and out of sync with your natural rhythm – science says daylight is more essential than we think.”

Dr Nigel Oseland

Have you ever watched a matinee performance at the cinema then on exiting feel somewhat discombobulated? Have you ever been slightly startled when the lights are turned on full blast after a concert? This is partly due to our evolutionary innate affinity to nature, harping back to the days of surviving on the African savanna. The lives of early Homo sapiens were governed by daylight, initially assisting foraging and hunting then rudimentary farming. Daylight was the primary indicator of the passing of time, over the day and across seasons. So, sitting in a darkened room during daylight hours will seem out of sync with normal daytime activities. And this does not just occur in the cinema but also in offices, conference suites and other workplaces. Many desks in deep-plan offices are some distance from the perimeter and daylight, despite best practice suggestions of being within 6m, whereas others have tinted glass and some (such as my son's partner's office) have no windows at all. I regularly speak at conferences and have found that

many meeting suites are internal with no windows, but delegates may spend long periods of time in them over several days.

But what if, rather than relying on Daylight affects our biological clock and circadian rhythms, our waking and sleep cycles. Daylight stimulates cortisol, also known as the “stress hormone”, released by the adrenal cortex preparing us for action. Serotonin, a neurotransmitter that enhances mood, is also stimulated by light. Daylight intensities found in the morning typically produce optimal levels of serotonin to engender a state of high alertness but not stress. In contrast, light suppresses melatonin so that when daylight levels fade, the pineal gland produces more melatonin, which in turn induces relaxation and aids sleep. Absence of daylight can therefore trigger early, i.e. afternoon, drowsiness. So, dark and dingy, or deep-plan, office spaces devoid of good daylight could reduce cortisol and serotonin but increase melatonin production, thus inducing drowsiness in office workers.

Journal of Biophilic Design

THE SCIENCE

Too little daylight at the normal times can also disrupt sleep patterns which in turn will affect alertness during morning work. For example, office workers with windows had on average 46 minutes more sleep each night compared to workers without them and being close to windows increased focused work by 15%ⁱ. Furthermore, as well as cortisol following a diurnal pattern it also has a seasonal variation with higher levels in summer than in winter. One study found that office workers close to a window had higher levels of cortisol during summer than in winter, making them feel more alert and activeⁱⁱ.

Natural daylight lies at the blue end of the colour spectrum, whereas yellow tones closer to the opposite end of the spectrum correspond to loss of daylight at dusk and dawn. A study of office workers' behaviour under electric light and

daylight conditions over several weeks found that blue-enriched light, during the daytime, resulted in higher subjective alertness, enhanced performance and less sleepinessⁱⁱⁱ. The researchers discovered that just 30-minutes' exposure to bright daylight near windows was as effective as a short nap in reducing post-lunchtime drowsiness.

Another study examined people undertaking computer and paper-based reading tasks at low and higher illuminance levels under a range of light colour spectrums^{iv}. The participants preferred higher colour temperatures at the lower illuminance levels. Cool white LED lighting has more blue light than standard incandescent or fluorescent lighting so is better for maintaining alertness during the day (but blue light electronic screens should be avoided at night).





In contrast, warm lights such as the yellows at the end of the day make the environment feel more welcoming and relaxing^v. This most likely relates back to those early Homo sapiens who would spend the evening around a campfire sharing stories and food.

Daylight is also essential for Vitamin D production, synthesised in our skin when exposed to direct sunlight. Vitamin D allows the body to absorb calcium, essential for strong and healthy bones, whereas Vitamin D deficiency

is associated with muscle weakness, immune system disorders, fatigue and depression. Recent studies have also found a relationship between Vitamin D and cognitive impairment (a precursor for dementia) in the elderly. Fortunately, exposure to sunshine for 15-20 minutes for three days per week is usually sufficient for Vitamin D production. In contrast, the extended lack of daylight in winter in some regions of the world or continuous nightshift working is not so good for Vitamin D production.

The BCO emphasises that “The amount of daylight available to occupants will be seen as an important indicator of workspace quality. Spaces that predominantly rely on artificial lighting will not provide anything like the same standard of lit environment”^{vi}. CIBSE, uses a daylight factor as a metric of the quality of daylight in an office^{vii}. The daylight factor is a predictor of occupant satisfaction with daylight and may be used as an initial design parameter. CIBSE state:

“If the average daylight factor exceeds 5% on the horizontal plane, an interior will look cheerfully daylit, even in the absence of sunlight. If the average daylight factor is less than 2% the interior will not be perceived as well daylit and electric lighting may need to be in constant use.”

A good daylight factor target for offices is therefore 2-5%, and 80% of the office floor space should have a daylight factor greater than 2%. But, the quality of

the light and the corresponding hue, the colour spectrum, are also relevant. Furthermore, daylight ingress is usually due to adequate windows which also offer views out. Several studies have reported the benefits of views out over nature, also part of our evolutionary preferences. For example, a study of a Californian call centre found that workers with a nice view from a window were able to process calls 7% to 12% faster than their colleagues^{viii}.

Daylight affects mood and motivation; designing offices with good daylight is essential for better wellbeing and performance. Nonetheless, we should also encourage employees to spend some time outside walking in the sunshine amongst nature.

This short paper is based on “Chapter 9 The Great Indoors” in *Beyond the Workplace Zoo: Humanising the Office* (Oseland, 2022).

<https://workplaceunlimited.com>

- i WGBC (2014) *Health, Wellbeing & Productivity in Offices*. London: World Green Building Council.
- ii Erikson and Kuller (1983) Non-visual effects of office lighting. *CIE 20th Session, Amsterdam, Volume 1*.
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- iv Lee, Moon and Kim (2014) Analysis of occupants’ visual perception to refine indoor lighting environment for office tasks. *Energies*, 7(7), 4116-4139.
- v Souza (2019) How lightning affects mood. *ArchDaily*, 12 August.
- vi BCO (2014) *Guide to Specification*. London: British Council for Offices.
- vii CIBSE (2015) *Environmental Design: CIBSE Guide A*. London: Chartered Institution of Building Services Engineers.
- viii Heschong Mahone Group (2003) *Windows and Offices: A Study of Worker Performance and the Indoor Environment*.

WHERE SUNLIGHT MEETS TIMBER – CRAFTING SPACES THAT BREATHE WITH NATURE

“There is no true substitute for the warmth of natural light streaming through timber-framed windows, connecting us to the outdoors and enhancing both our wellbeing and our environment.”

Simon Corbey

Last week I attended the Built by Nature¹ Spring Symposium at Walworth Town Hall, which was ravaged by fire in 2013 and has now been sensitively restored by General Projects. Built by Nature work in harmony with nature and are a network and grant-making fund dedicated to accelerating the timber building transformation in Europe. They fund amazing work, one example of which is a recent report by architects dRMM into the carbon and quality of life indicators associated with mass timber buildings.² They also funded our recent research project aimed at connecting our buildings to their forest of origin.³

The first thing that struck me as I walked into the Town Hall, was the

evocative smell of Pinene, due to the new mass timber elements in the café area. The first floor had an atrium which at first sight, was bathed in daylight, but it was explained by our tour guide, that the programmable lighting running through the perspex, gives the effect of daylight.

We are getting better at designing low energy lighting that mimics the effect of daylight, which can be programmed to follow natural light patterns as they vary through the day, but I’m not sure this will ever be a replacement for natural light and the view to the outside of the building that windows and roof windows offer. Of course, we would favour timber windows over uPVC (please see my blog⁴) and we host a working group Reducing Plastics in the Built Environment.⁵





This is why it is so important that we make the most of the orientation of our buildings and maximise the opportunity to bring the outside in and offer occupants that link with the outside and to nature. I am lucky enough to live in a south facing house, which means the space is flooded with natural light, which means I don't need artificial light most of the time and it also means the space is warmed due to solar gain, so that even in the Winter on a sunny day, I don't need any heating.

We all know that exposure to daylight is intrinsically linked to our mood and research demonstrates that exposure to daylight has numerous positive effects. One study in a Pittsburgh hospital (Walch, 2005) compared patients' post-surgery. Half of the patients were housed in a wing of the hospital with good natural light levels and the other half in another wing, where light levels were constrained due to the proximity of other buildings. Results showed that the first cohort of patients in the brightest rooms took 22% less analgesic medicine/hr and experienced less stress and marginally less pain. This resulted in a 21% decrease in the costs of medicine for those in the brightest rooms. The mechanisms linking natural light to pain are currently unknown, however.

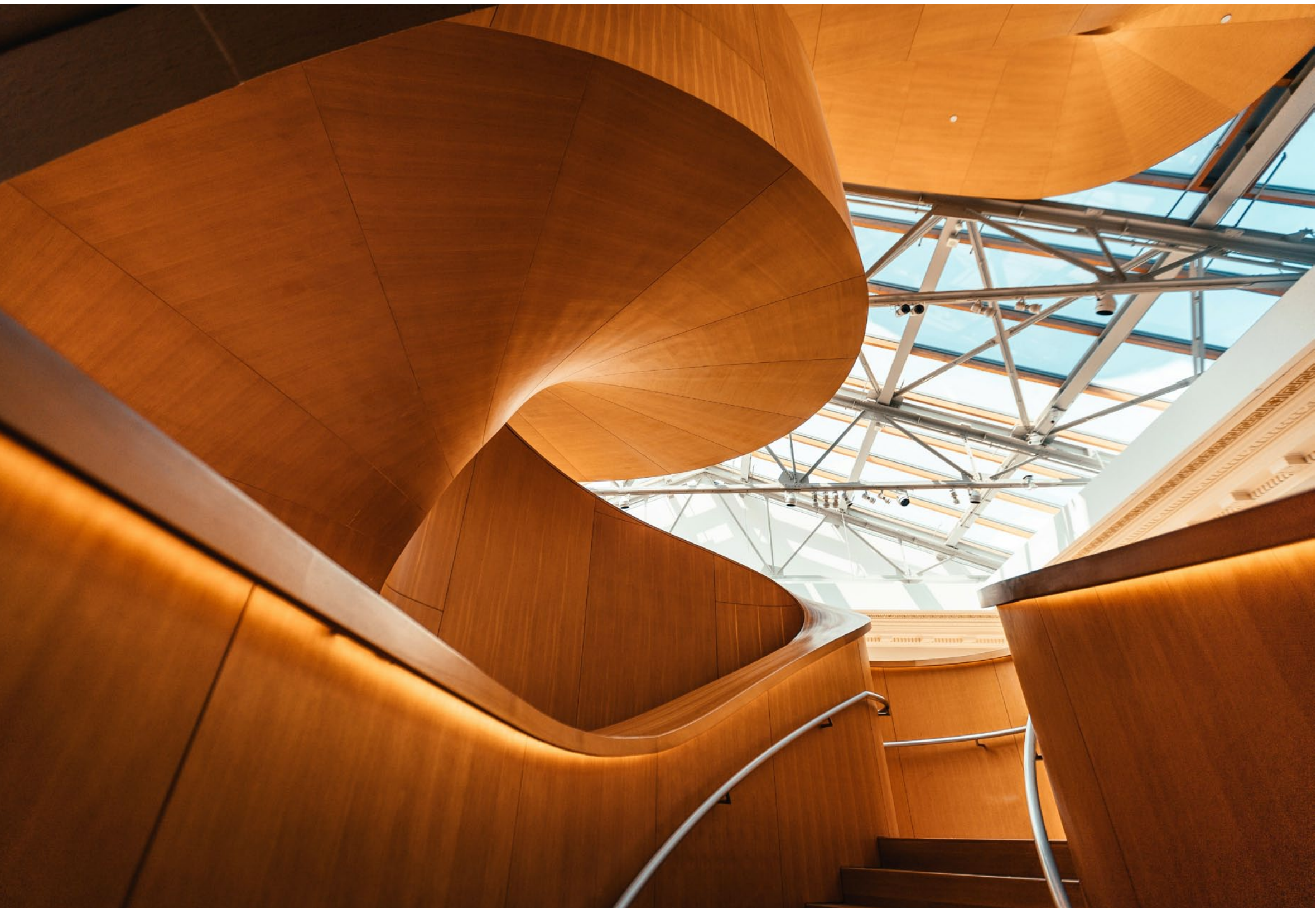
Of course, it would be great if our windows and rooflights could not only bring in light but generate power at the same time. Researchers in Denmark have set a new world record in efficiency for converting sunlight into electricity, by using new windows that allow light

to pass through while simultaneously generating power. The tandem solar cell mainly harvests energy from the infrared and ultraviolet parts of the sun's rays, but not from visible light.

This then allows the light from the visible spectrum to pass through while leaving the visible spectrum relatively untouched.⁶

Traditional glass, called soda-lime glass, is made by floating molten glass on top of molten tin, which is a cheap and effective process but leaves microscopic flaws. With Gorilla Glass, molten glass with different additives than soda-lime glass cascades in a waterfall as thin as half a millimetre, which rapidly cools and is cut to size, yielding glass that is nearly flawless. The glass is also chemically strengthened, making it resistant to scratches and chipping. This glass is currently used in mobile phones but is now being scaled up by Corning, for use in architectural glass.⁷

Healthy Homes APPG published a White Paper back in 2018 which calls for the Government to provide a public health focus that considers the indoor environment as much as the external environment, consistent with the fact that most people spend 90% of their time indoors. They note that the effects of poor housing on the NHS in 2010, in terms of the first-year treatment costs of specific health hazards, was estimated to be at least £1.4bn per year in the poorest housing in England and to be £2.5bn per year when considering all housing throughout the entirety of the UK.⁸



Studies have shown that natural light is the single most valued attribute in residential settings, with over 60% of respondents ranking it as essential (Finlay, 2012) The World Health Organization (WHO) has also linked inadequate daylight exposure to increased risks of depression and falls, emphasizing its significance for both physical and mental well-being (Brown, 2011).

Simon Corbey is CEO for The Alliance for Sustainable Building Products
The author would like to thank Eugenia Maslova, Technical & Regulatory Affairs Advisor at Velux and Nicola Harrison at Bereco for their contributions to this article.
<https://asbp.org.uk>

¹ <https://builtbn.org>
² <https://we.tl/t-1GMGSIzryn>
³ <https://asbp.org.uk/project/impactt>
⁴ <https://asbp.org.uk/blog/plastics-issues-impacts-and-alternatives>
⁵ <https://asbp.org.uk/group/plastics-in-construction>
⁶ <https://www.euronews.com/next/2025/03/26/solar-panel-windows-that-could-turn-whole-buildings-into-power-plants-smash-electricity-re>
⁷ <https://www.msn.com/en-us/money/other/a-piece-of-glass-thinner-than-a-credit-card-could-solve-america-s-25-billion-energy-problem/ar-AA1Bq8JK>
⁸ <https://healthyhomesbuildings.org.uk/wp-content/uploads/2019/04/HHB-APPG-White-Paper-V2.pdf>

On the Right Wavelength

The crucial role of infrared light in health

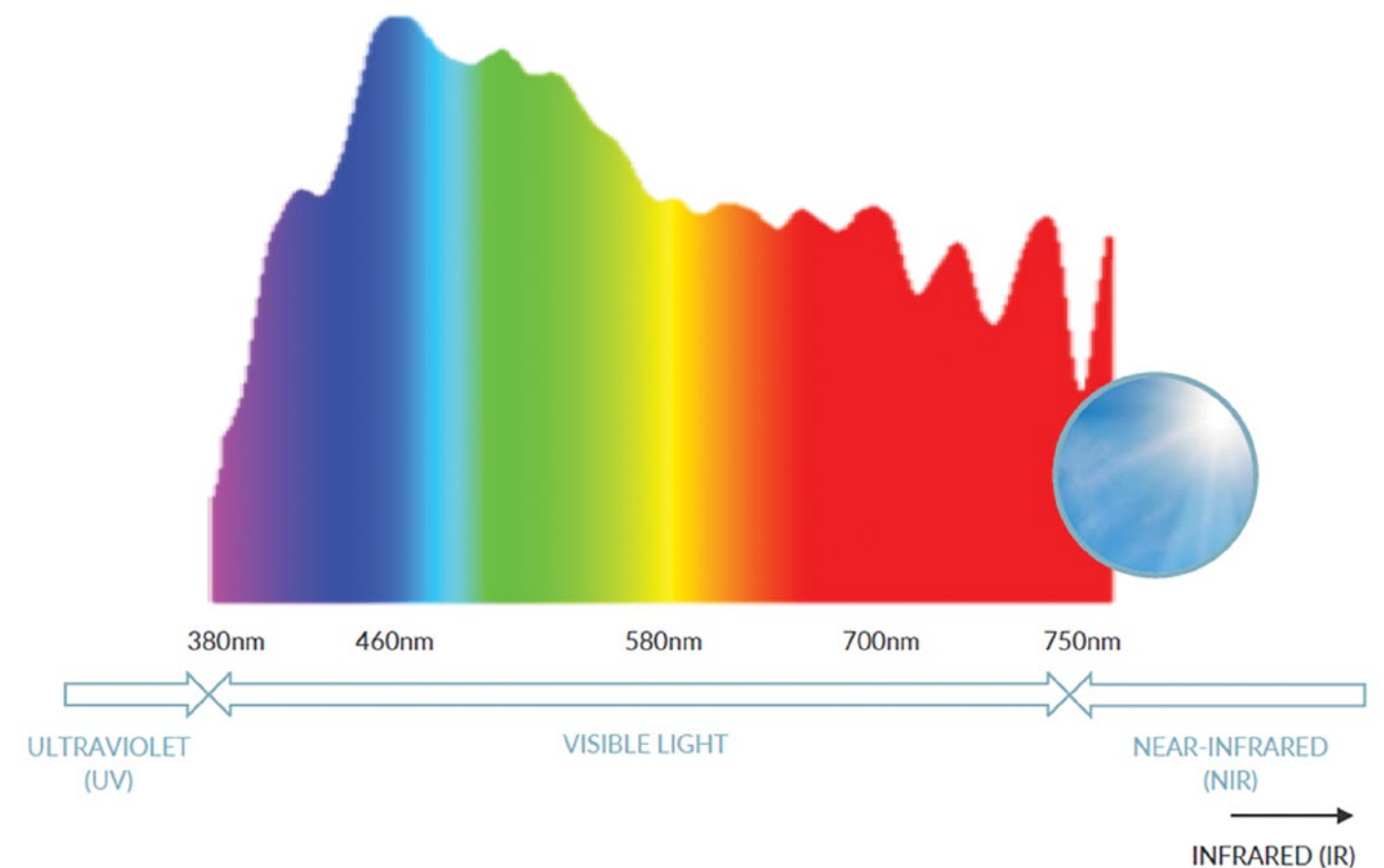
Ruth Kelly Waskett and Kael Gillam

Over the past two decades, our understanding of the impact of light on human health has undergone a step change, and we now recognise the importance of light exposure and timing to synchronise our circadian rhythms. This has led to the development of lighting systems and approaches often referred to as 'circadian lighting' or 'human centric lighting' that are designed to promote a healthy circadian cycle. Blue-rich light is understood to be an important component of morning and daytime lighting to promote wakefulness and aid sleep at night by supporting the natural cycle of the hormone melatonin. Because of this, we now know that lighting plays a crucial role in supporting health through circadian entrainment. While natural light is the most effective light source to provide this, artificial lighting can play a supporting role in the right circumstances.

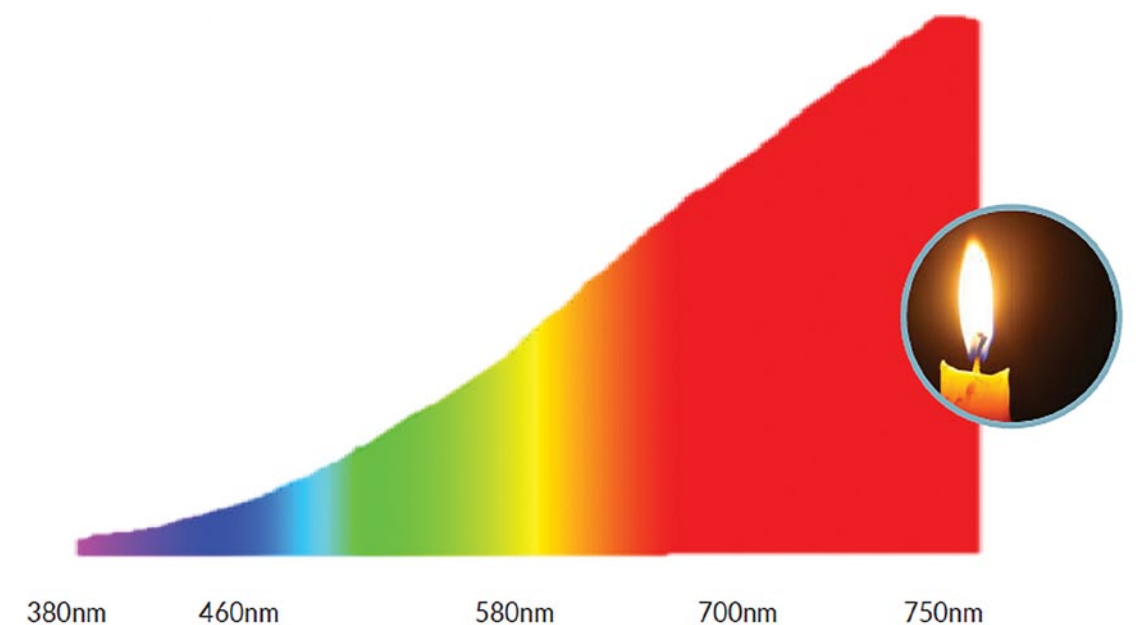
A new research direction, looking at the role of light wavelengths from the red end of the visible spectrum and beyond, has opened up another dimension to human-centric lighting with arguably more wide-ranging implications for health.

Red wavelengths

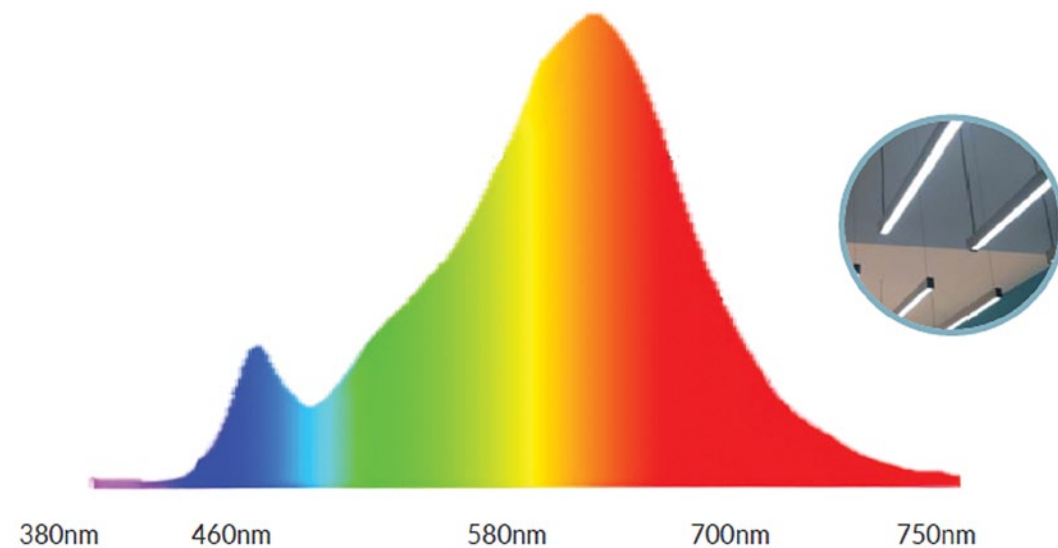
We evolved under daylight, which is characterised by a broadband spectrum providing energy across all the wavelengths in the visible spectrum:



As humans came to spend more time inside buildings, we created light using other means. The earliest artificial light used incandescent sources (i.e. burning things, and latterly tungsten filament lamps), which have a spectrum characterised by less energy at the blue end of the spectrum and more in the red end.



With the advent of other types of artificial light, the spectral characteristics have changed, with increasing drive to make the light as efficient as possible by delivering energy within the visible part of the spectrum and minimising “wasted” non-visible radiation. The advent of LEDs for general lighting in the twenty-first century means that LED is now our default light source in the built environment. The spectral profile of LED varies considerably between sources, but is generally characterised as shown here, with virtually no radiation outside of the visible light wavelengths.



In recent years, there has been a growing interest in the role of Infrared (IR) and Near-infrared (NIR) light on human health. These longer wavelengths of light supply our bodies with cellular energy via the mitochondria. The health of mitochondria is critical to a wide range of processes in the body, most notably cell regeneration and tissue repair. Recent and emerging studies suggest that exposure to longwave light is associated with improved vision and reduced blood glucose levels as well as improved recovery from injury and tissue damage.

Among scientists studying this subject are Professors Glen Jeffery and Bob Fosbury at University College London, who have raised the alarm at what they believe to be a concerning consequence of LED lighting. Given that LEDs are deficient in energy in the IR and NIR part of the spectrum, if we spend most of our time in indoor spaces illuminated by LED light sources, then we are missing out on vital wavelengths of light.

We already know about the importance of blue-rich light for our circadian system, so this new understanding points to the importance of balancing the blue end of the spectrum with energy from the red end.

The role of daylight

This new research reinforces the importance of daylight exposure for human health. In the built environment, we can provide well daylit spaces so that the deficiency of IR in artificial lighting is much less of a problem. But indoor daylighting is only a partial solution, as commercial buildings are routinely fitted with glazing that is designed to filter out IR radiation and minimise solar heat gain. Currently, domestic buildings in the UK generally don't have solar control glazing, but most commercial buildings do and therefore having good daylighting will not necessarily address the IR deficiency of artificial lighting. The role of glazing should be explored further, with a view to understanding whether there are specific wavelengths of IR light that could be admitted without increasing overheating potential.

The power of plants

Research also points to the role of plants in reflecting IR and NIR light in interiors. Plant leaves are excellent reflectors of light in NIR part of the spectrum. This can be seen in this photo taken by Prof. Fosbury showing an apple tree, with a regular photo (left) and with an RG780 NIR filter (right).



This suggests that plants located just outside windows could act as amplifiers, maximising the quantity of NIR going into a room. Likewise, plants located inside the room near windows could be beneficial. However, this would only be effective if the glazing does not filter out IR radiation.

Can we supplement artificial light with infrared?

In theory, LEDs for general lighting could be developed that produce an IR component, but this could be a significant challenge for the lighting industry. Adding non-visible radiation into light sources also poses a problem for energy efficiency, as our current metrics of light source efficacy is based purely on the delivery of visible light.

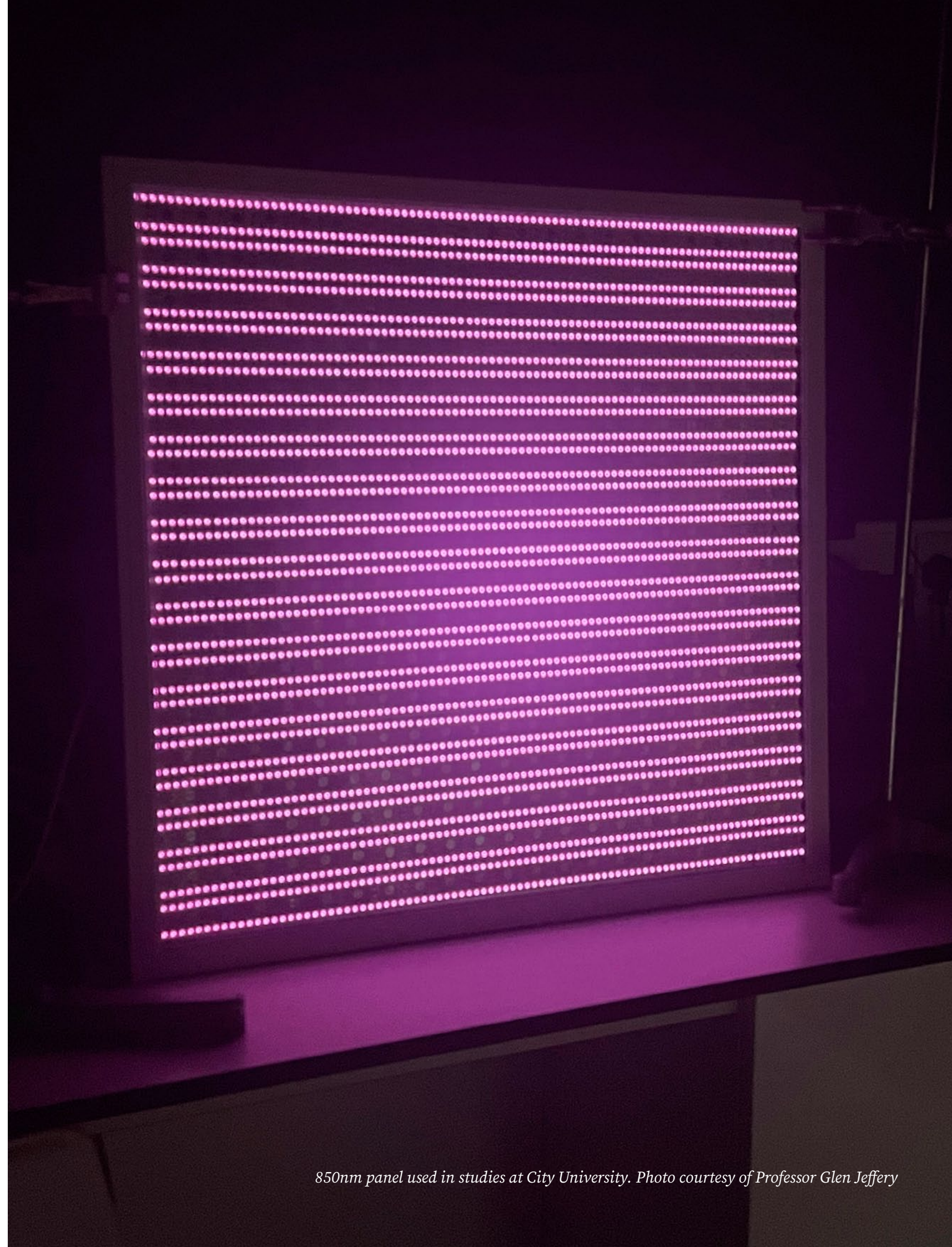
Another approach would be to add separate IR emitters to spaces. These would not need to be on continuously and would not emit visible light. Professor Jeffery has been trialling a prototype 850nm panel in clinical studies at UCL. Exposures can be brief but timed to fit with the circadian cycle of the mitochondria, which means morning exposure works best. Occupants do not need to be orientated towards the panels, since it is skin exposure that provides the benefits. And in fact, IR radiation transmits through most clothing, so skin exposure is not even a pre-requisite for benefits to be realised.

Last year, some of our lighting team at Hoare Lea took part in the study; they attended the lab at the same time on the morning of two consecutive days and took part in an experiment aimed at investigating whether a long wavelength of light (850 nm), delivered indirectly (i.e. not direct to the eye, but by exposure to the back) had a beneficial effect on colour contrast thresholds. The findings indicate that exposure to 850 nm light does indeed have a beneficial effect on colour contrast perception. The retina contains the highest concentration of mitochondria in the body, which is why the impact of exposure to IR radiation can have such a measurable effect on the visual system.

Looking to the future

The science on the benefits of IR and NIR light for humans is well developed. What we don't fully understand is how this can be applied to our built environment to ensure that we are creating buildings that promote health. As our understanding of the power of light in improving our health and wellbeing increases, we need to stop thinking of lighting in buildings as being about delivering functional illumination. Light gives us so much more than vision and adopting a holistic approach to lighting is the only way forward.

hoarelealea.com



850nm panel used in studies at City University. Photo courtesy of Professor Glen Jeffery

The Biology Behind Biophilic Design

“Understanding biological mechanisms isn’t academic extracurricular – it’s professional necessity. When we comprehend why certain design decisions trigger specific physiological responses, we move beyond superficial nature-inspired aesthetics toward purposeful, health-promoting environments for today and future generations.”

Dr Tuwanda Green, AIA

Introduction

Imagine yourself stepping inside a gleaming high-rise office tower. Your footsteps echo across a vast, empty atrium as sunlight streams through floor-to-ceiling glass walls. Despite the highly polished finishes and carefully placed lounge furniture, the space feels vacant and uninviting – even during business hours. You instinctively search for directional signs to escape the disorienting void, all while feeling inexplicably uneasy, as if you’re trespassing in this sterile lifeless environment. “Which way do I go?” This visceral reaction isn’t paranoia or personal issues – it’s your biology responding to a design that ignores as our evolutionary legacy (Wilson, 1984).

Biophilic design addresses this fundamental disconnect by consciously weaving nature into our built environment. At its core, it means

creating spaces that restore our connection to the natural world, even when we’re surrounded by concrete, glass, and steel. This approach recognizes that the human affinity for nature – biophilia – isn’t just a quaint preference but an evolutionary adaptation essential for our physical and mental wellbeing.

Today’s architects and designers face mounting pressure to deliver spaces that promote wellness, meet sustainability targets, and satisfy increasingly sophisticated clients who demand evidence-based solutions. Biophilic design isn’t merely another trend to add to the checklist; it’s an evidence-based practice grounded in neuroscience, environmental psychology, and epigenetics. However, integrating these principles often requires fundamental adjustments to established design workflows, creating tensions with other requirements like accessibility, code compliance, and energy efficiency.

Journal of Biophilic Design
THE SCIENCE

The challenge lies in translating scientific findings into practical applications. While researchers have amassed compelling evidence about how natural elements influence human cognition, stress responses, and even gene expression, these insights often remain locked in academic journals. It is essential that we consider how circadian lighting patterns affect melatonin production and cognitive performance – this knowledge exists, yet many practitioners lack concrete frameworks for implementing it in their projects.

Understanding these biological mechanisms isn’t academic extracurricular – it’s professional necessity. When we comprehend why certain design decisions trigger specific physiological responses, we move beyond superficial nature-inspired aesthetics toward purposeful, health-promoting environments for today and future generations. This introduction will help bridge the gap between biological research and daily design practice, demonstrating how our evolutionary past can inform our architectural future.

Image created using Midjourney (2025).

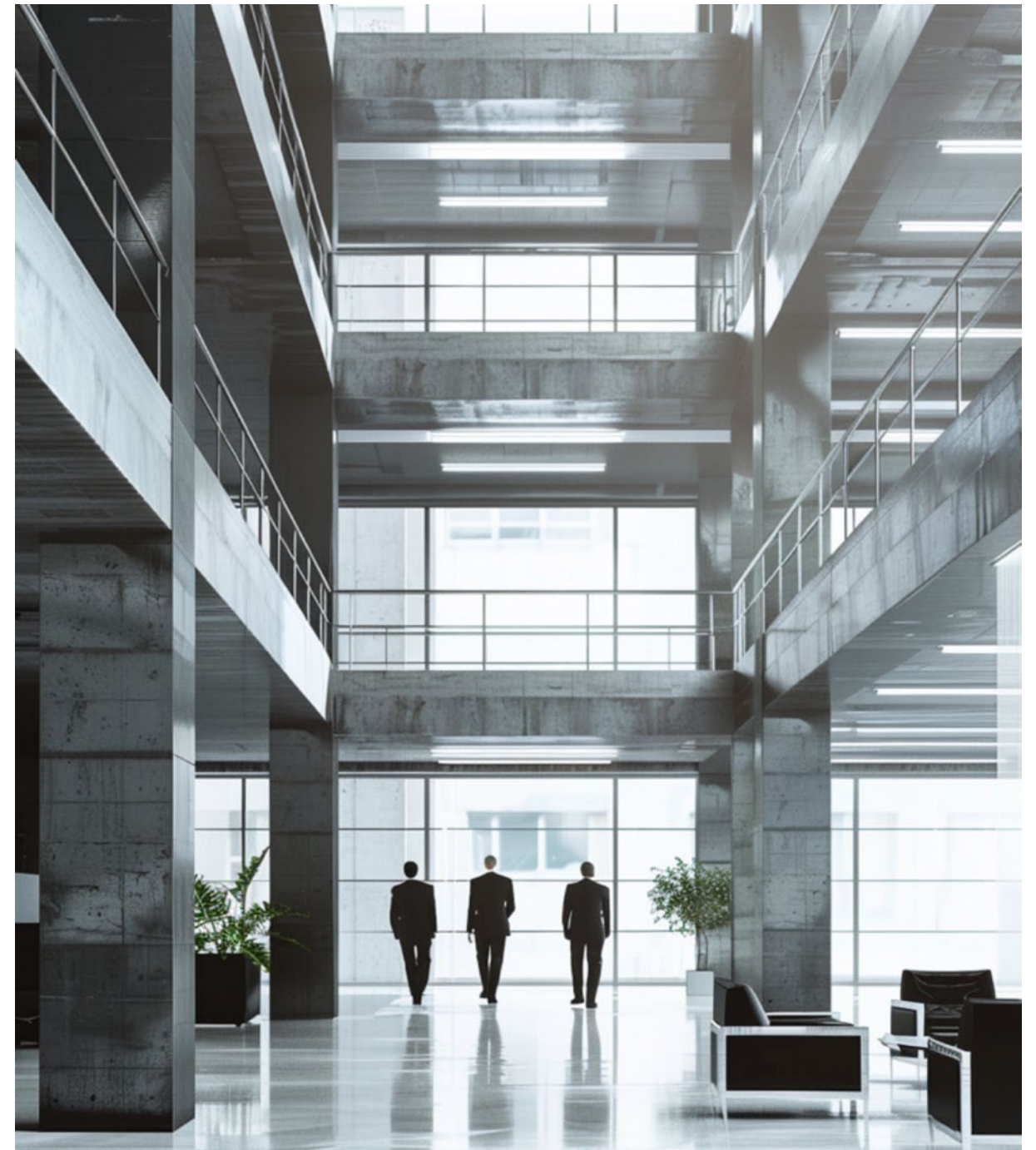


Figure 1 Three professionally dressed individuals walking through a brightly lit, multi-storied sleek office atrium with polished surfaces and a sterile ambiance.

To understand how these biological responses play out in real spaces, let's examine this typical office atrium in detail. We will explore how environmental factors influence complex biological systems within our bodies from the ways natural light patterns regulate our circadian rhythms to how spatial layouts affect stress hormones. Further, they'll provide insights for translating this knowledge into spaces that support human flourishing. Because ultimately, the most successful buildings aren't just structurally sound or visually appealing, they're biologically resonant with their occupants.

Neurobiological and Epigenetic Foundations for Designers

Think of the human brain as an ancient compass that has evolved over millennia to read the built environment like a map. When architects and designers understand how this biological compass works, they can craft spaces that guide, comfort, and restore rather than disorient and stress. At the heart of this

navigation system lies our hippocampus, featuring specialized neurons known as place cells and grid cells that encode spatial layouts much like a digital map records GPS coordinates. These cells fire in specific patterns as we move through buildings, creating neural representations that help us remember where we are and where we've been (Moser, Kropff, & Moser, 2008). This biological feature explains why landmark-rich designs like distinctive artwork, unique architectural elements, or visual waypoints dramatically improve wayfinding, becoming particularly crucial for populations experiencing dementia who rely heavily on these spatial memory cues.

Working alongside the hippocampus, the parahippocampal place area (PPA) acts as our brain's architectural photographer, constantly capturing and processing landmarks and geometric patterns within buildings. This region links visual cues to spatial memories, helping us recognize and recall familiar environments. Meanwhile, our prefrontal cortex functions as the executive director

in the dorsal anterior cingulate cortex (dACC), integrating all this spatial information with our goals and intentions, determining the most efficient paths through spaces. When environments lack clarity or obvious navigation cues, this decision-making process becomes taxing, activating the anterior cingulate cortex (ACC) and triggering stress hormone release, including cortisol.

The design implications of these neurobiological mechanisms extend beyond mere wayfinding. Every architectural decision potentially influences our stress response and cognitive restoration.

Research demonstrates that poorly navigable spaces can lead to elevated cortisol levels (Lin, Li, Rao, & Lovreglio, 2023) while clear, nature-inspired layouts support the brain's natural stress-reduction mechanisms (Mavros, J Wälti, Nazemi, Ong, & Hölscher, 2022). Even more profound are the epigenetic impacts – how designed environments influence gene expression over time. Studies reveal that stress can trigger methylation

changes in crucial genes. For instance, Stress-induced hypermethylation of the NR3C1 gene (master stress regulator) is linked to increased vulnerability to stress-related disorders (Mourtzi, Sertedaki, & Charmandari, 2021). Similarly, MTNR1A and MTNR1B (melatonin protein instructors) mediate melatonin signaling and regulate circadian rhythms. Disruption in their function can impair melatonin's ability to synchronize biological clocks, regulation and oxidative stress responses (Chaste et al., 2010). When we are chronically exposed to stress-induced designed environments that lack wayfinding or regular exposure to natural light, epigenetic disorders may also occur.

Most studies of the built environment focus on physiological, psychological and cognitive effects of stress rather than molecular mechanisms (like gene expression regulation through epigenetic modifications). But recent epigenetic studies can help us begin to relate their findings to how stress impacts us on a molecular level present day and in future generations.

Figure 2 Key Biological Systems in Spatial Navigation.

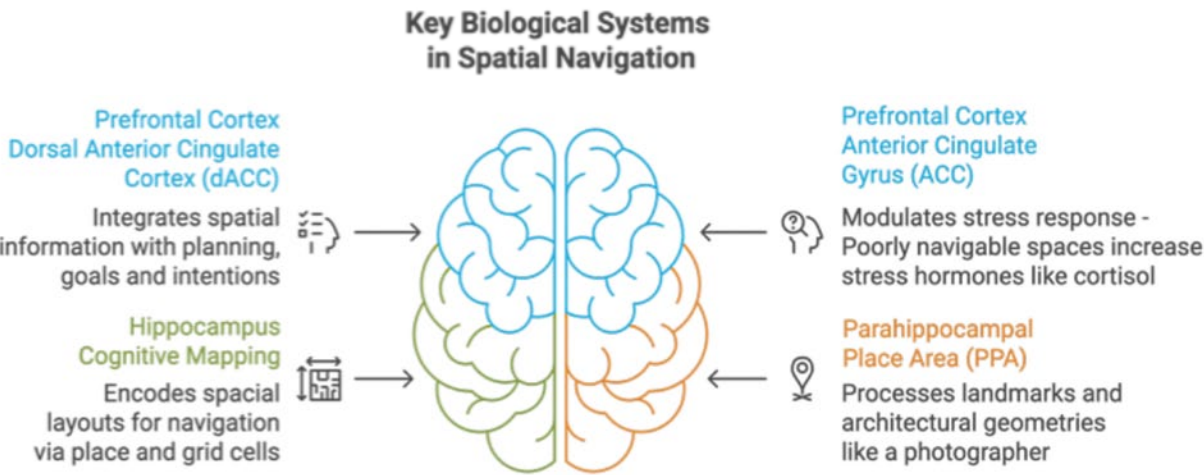


Figure 3 DNA Genes with Epigenetic Methylation Gumballs.

Translating Theory to Design Decisions

These biological insights translate directly into design solutions. Incorporating tunable window tinting or prismatic glazing to maximize daylight penetration while minimizing glare (Mary Guzowski, 2020) support MTNR1A and MTNR1B mediated circadian entrainment genetic impacts. Replacing reflective surfaces with matte

finishes and implementing diffused lighting systems can prevent harmful methylation patterns. By understanding these mechanisms, designers can move beyond intuition to create spaces that support both immediate neurological comfort and long-term genetic health, demonstrating that thoughtful architecture doesn't just shape our immediate experience – it can influence our biological destiny.

Conclusion

Collaborative research between design and biology is gaining momentum. While scientific studies haven't traditionally focused on architectural applications, interdisciplinary partnerships are more common. Architects, designers, and biological researchers increasingly collaborate during early conceptual design phases, allowing evidence-based insights to inform projects from their inception rather than being retrofitted later.

Why does this level of understanding matter in our built and natural environments? Because every building we design is a health intervention. Architectural choices influence stress hormones, immune function, cognitive development, and even how genes are expressed in future generations. Our world is struggling with mental and physical health crises, aging populations, and climate change. So, creating biologically supportive environments isn't just good design practice, it's an ethical urgency.

Dr Tuwanda Green is Adjunct Professor of Virginia State University, she also sits on the board of the Biophilic Institute, and was an architect for the US Government for over 20 years. She recently spoke at one of our online, exploring how our brains react to nature and epigenetics [Biophilic Design Networking lunches](#).

To connect with Tuwanda visit: [linkedin.com/in/dr-tuwanda-green-aia-233524280](https://www.linkedin.com/in/dr-tuwanda-green-aia-233524280)

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Figure 4 A biophilic designed two-story modern office atrium. Sunlight pouring through clerestory windows and skylights, mass timber beams, and natural wood ceiling. Lush indoor plants, café tables and benches, people eating food, talking casually, sitting and or strolling.

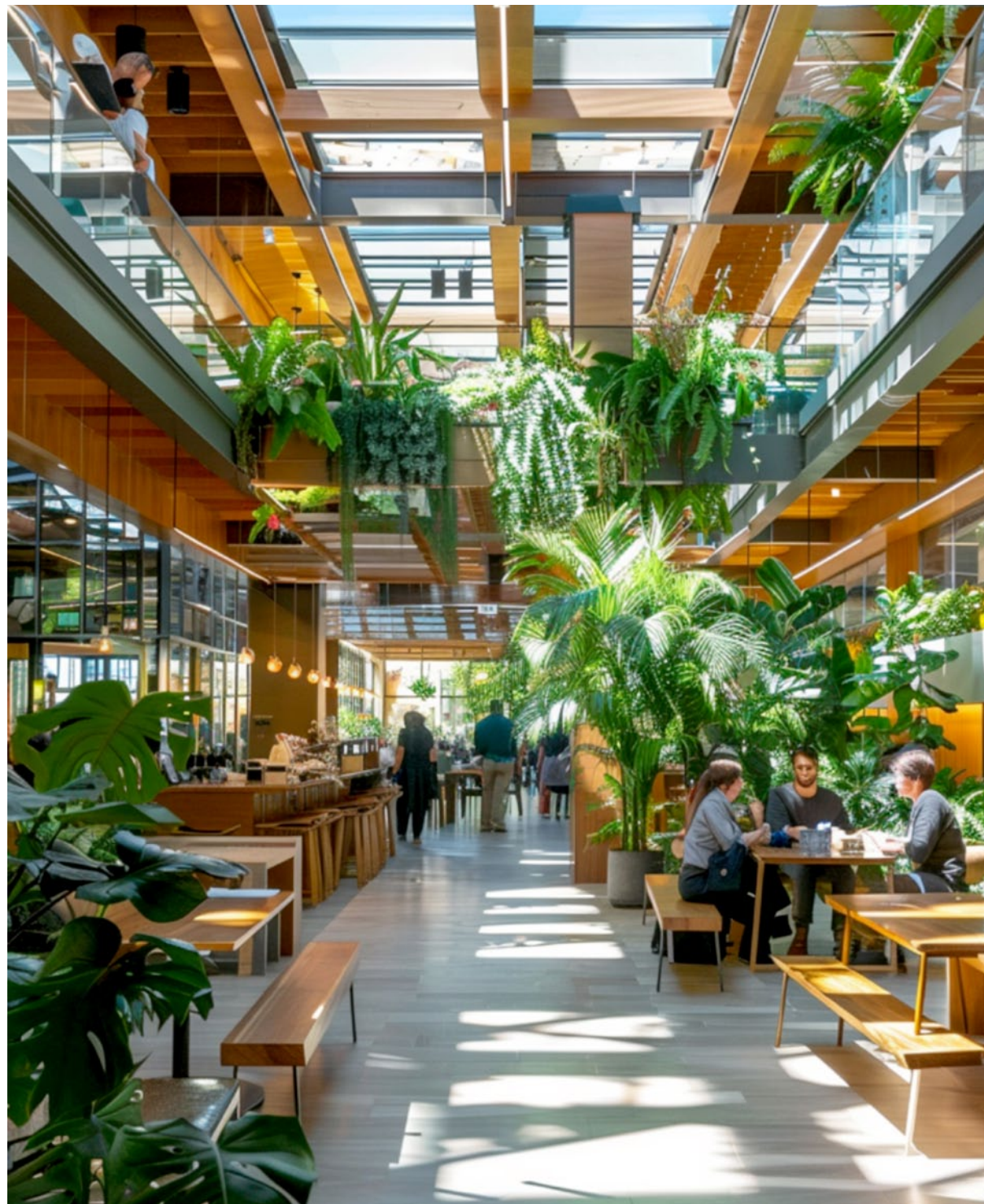


Image created using Midjourney (2025).



PLANTS

BIOMATERIAL DESK LAMPS

A natural solution for beating seasonal depression in universities

Eleanor MacMillan

It is that time of year again, where we start to be thankful that the daylight hours are getting longer and are commutes to work are getting brighter. That first glimpse of the summer's sunshine hits us and turns on our positivity switches, as we catch ourselves smiling more and wanting to be outside.

It is during this time, we must reflect on why we may be feeling this way ... Sadly, across the UK, many of us experience the effects of 'seasonal affective disorder' (SAD), a type of depression that is linked to the lack of natural sunlight. As a student, studying in university classrooms, I have felt this. As an employee, working in an office all day, I have felt this. This 'feeling' is in fact causing many of us to have lower energy levels, a difficulty concentrating, and an overall negative mood – which is not ideal in a workplace. So, as a textiles designer and material researcher, how do I think we could tackle this?

My practice explores using biomaterials within contemporary design applications, by connecting with and learning from, upcoming bio-design innovators

exploring the latest biomaterial applications and technologies. I believe that biomaterial-based lighting solutions may be the way forward for beating those winter blues. Who really wants to work in an office with black furniture, grey keyboards, bright white lights and sometimes, have meetings in rooms with no windows? Not me. Desk lamps made from natural, naturally dyed fabric or light-enhancing materials, may be a solution. Through my experimentation with dyeing natural textiles fibres, I have achieved a collection of neutrals to bright pink, yellow and green hues, from food waste streams as simple as blueberries, raspberries, and onion skins. You can also use seaweed-based polymers such as spirulina to bring in those trendy green and blue shades. Biomaterial-based lighting features made from wood, mycelium, algae-based biopolymers, and bio-fabricated materials, wrapped within naturally dyed lampshades may provide a more natural diffusion of light, mimicking the softer golden glows of daylight. Most designers would recommend these options within bedrooms and livings, places where we seek relaxation, so why are we not implementing these at work too?





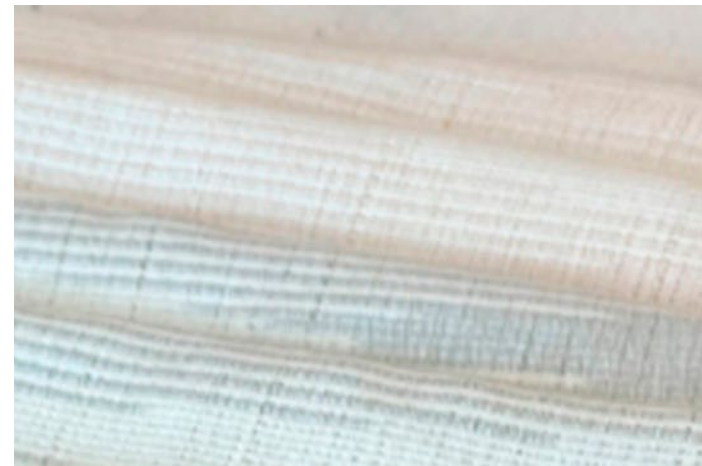
The texture and aesthetics achieved through natural dyes and biomaterials may also play a role in reducing mental fatigue and increasing students' overall well-being. Unlike plastic or metal lamps, which are dotted across campuses, materials like wood, cork, and natural fibres can create a biophilic connection – the innate human affinity for nature. Look at Alkesh Parmars orange peel lampshade for example, imagine looking up from your

computer screen and seeing that! I am sure it smells amazing too. This sustainable approach also aligns with many universities' growing commitments to implement more eco-friendly infrastructures. Incorporating biomaterial-based desk lamps in university settings is more than an aesthetic choice – it is a functional, mental-health-conscious decision. As universities continue to seek innovative ways to enhance student well-being, I think biomaterial lighting paired with naturally dyed fabrics in study spaces

have positive potentials. What do you think, would you benefit and be inspired from occasionally glancing at an orange-peel lampshade?

Eleanor MacMillan is a Textiles designer & Material Researcher. She is also Curator of BIO-ZINES. @by.elle.mae
<https://eleanormacmillan5.wixsite.com/by-elle-mae>

Photos are taken by Elle Mae her natural dyes and biomaterial samples. The orange peel lampshade is by Alkesh Parmar.



Plants for light - and dark - spaces

“What plant where? Light makes all the difference. Read some brilliant advice from our friends at Plants@Work.”

Coll Smith

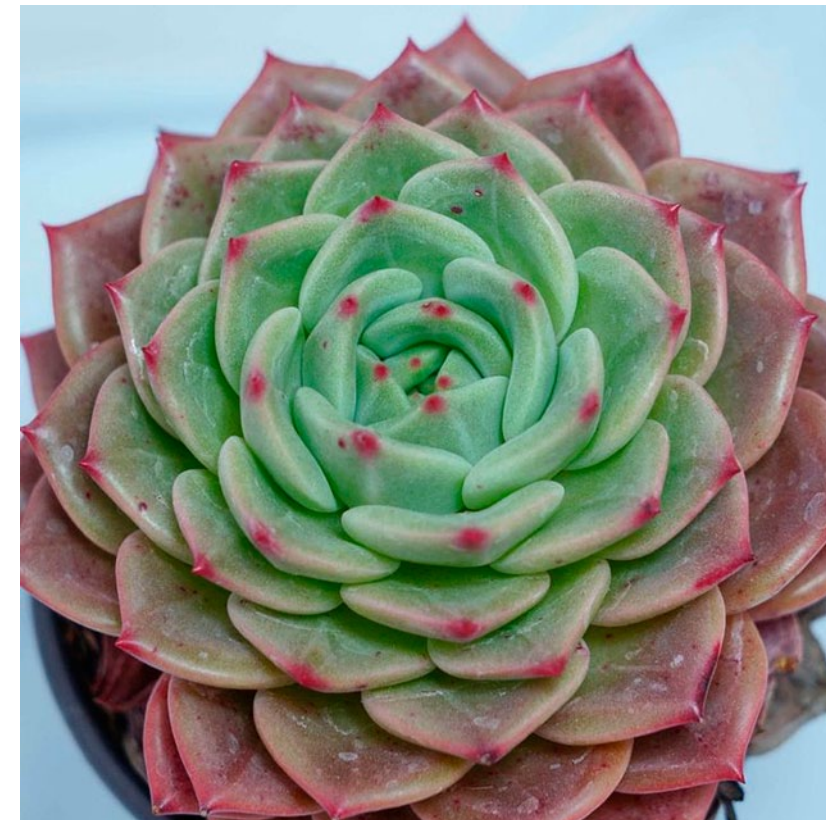
Light is a natural phenomenon in our 24 hour clock. For centuries it has dictated how we live using daylight hours for work and play and dark hours for sleep and to refresh us.

Of course light has also influenced plant growth throughout the centuries. All houseplants have their heritage in the natural world and are affected by light and dark. So of course many of the houseplants that we know and love can be traced back to growing naturally, mostly in warmer climates than ours, hence they have become known as houseplants and indoors is where many now flourish.

Best plants for sunny rooms are succulents and cactus such as **Albuca spirallis**, **Echevaria** and **Kalanchoe**. These plants love the sun and don't need protection from its rays.



Albuca spirallis



Echevaria



Kalanchoe courtesy of RHS

PLANTS



The **Jade plant** also enjoys the sun and needs a good dose each day to thrive. It is also a real easy-to-care for plant needing little water (it stores it in its succulent leaves) and can live for decades.

Jade plant courtesy of Bloom Box Club

Some other plants that enjoy a sunny windowsill or space include **Strelitzia Nicolai** otherwise known as the **White Bird of Paradise** due to its elegant white flowers which resemble birds of paradise with their wings open.



Strelitzia Nicolai courtesy of Gardening Express

PLANTS

Dwarf Musa Acuminata aka the **Banana plant** also enjoy a sunny windowsill.

Some plants need protection from the sun just like us

Many plants enjoy bright light but not necessarily the direct, hot rays of the sun which can burn their leaves. So like many of us, they need protection from the harsh, direct rays of the hot sun even though we love the light and warmth.

These plants include **Epipremnum pinnatum 'Golden Pothos'**, a colourful plant; the **Variegated Monstera** which likes the light but not the direct sun. Similarly, the **Alocasia Zebrina** also known as Elephant Ears likes the bright light of the sun but not directly on its leaves.



Variegated Monstera courtesy of Patch

Phalaenopsis aka **Moth orchids** and **Zygopetalum orchids** both like indirect sun; they thrive in bright light but cannot tolerate direct sun. Their long-lasting blooms will add elegance to any room.

Phalaenopsis orchids courtesy of Flower Council of Holland



Those that aren't sun lovers

Meanwhile, some plants love and prefer low light and can survive and decorate darker corners of our living or working places. Many of these originate from growing on forest floors below the shade of the trees. For these plants, direct sunlight can do more harm than good possibly making them suffer from leaf scorch or wilting if in the wrong position.

Also according to the RHS (Royal Horticultural Society), many houseplants add colour to dark spaces and prefer dark, shady corners reminiscent of shady forest floors. These include **Ivy**, **Boston Fern** and **the Aspidistra**, all classic houseplants which survive in dark corners.



Boston Fern courtesy of RHS

Other dark loving plants include the fascinating **Rhipsalis**, a succulent, despite its tolerance of darker spaces. The ever popular **Spathiphyllum** aka **the Peace Lily**, **Zammioculus** and the **Sanseveria** all tolerate and even love dark corners.

*Zammioculus
courtesy of Hortology*



*Peace lilies courtesy of
Flower Council of Holland*

What we learn from this is that whichever light your working or living space is blessed with, there are houseplants to suit and enrich the space.

www.plantsatwork.org.uk

Enhancing Garden Design with Lighting - Tips from William Sugg & Co.

Lighting plays a crucial role in garden design, transforming outdoor spaces into enchanting retreats. At William Sugg & Co., we understand the importance of well-placed lighting in creating a harmonious and inviting garden. Here are some tips on how to use lighting effectively in garden design, common mistakes to avoid, and how to decide where lighting should go.

The Importance of Lighting in Garden Design

Incorporating lighting into your garden design not only enhances its aesthetic appeal but also extends the usability of the space. Whether you're sitting

outside, working, or simply enjoying the outdoors, the right lighting can create a warm and welcoming atmosphere. Lighting is also a key element in Biophilic Design, which emphasizes the connection between humans and nature. By illuminating your garden, you can create a space that promotes relaxation, productivity, and well-being.

For instance Flambeaux lighting is a striking choice for garden lighting. Although they've been around for a while, the effect of flambeaux is as dramatic now as it was originally. The main feature of flambeaux lighting is an open flame that is fuelled by gas and in this modern day is still a symbol of celebration and drama.

Common Mistakes to Avoid

1. **Overlighting:** One of the most common mistakes in garden lighting is using too many lights. Overlighting can create a harsh and uninviting atmosphere. Instead, focus on strategic placement to highlight key features and create a balanced ambiance.
2. **Ignoring Shadows:** Shadows can add depth and dimension to your garden. Avoid placing lights in a way that eliminates all shadows. Instead, use lighting to create interesting patterns and contrasts.
3. **Using the Wrong Fixtures:** Not all lighting fixtures are suitable for outdoor use. Ensure that you choose fixtures that are designed to withstand the elements and provide adequate illumination for your garden.
4. **Neglecting Maintenance:** Outdoor lighting requires regular maintenance to ensure it continues to function properly. Clean fixtures, replace bulbs, and check for any damage to keep your garden well-lit and safe.





As the oldest Gas Lantern Manufacturer in the country, William Sugg & Co. maintains and supplies country and city estates, Royal parks and residential gardens with beautiful, handcrafted copper lanterns, designed to last generations. They have a wonderful highly-trained team of artisans who work to the highest standards of manufacture, reproduction and refurbishment.



Deciding Where Lighting Should Go

When planning your garden lighting, consider the following factors to determine the best placement for your lights:

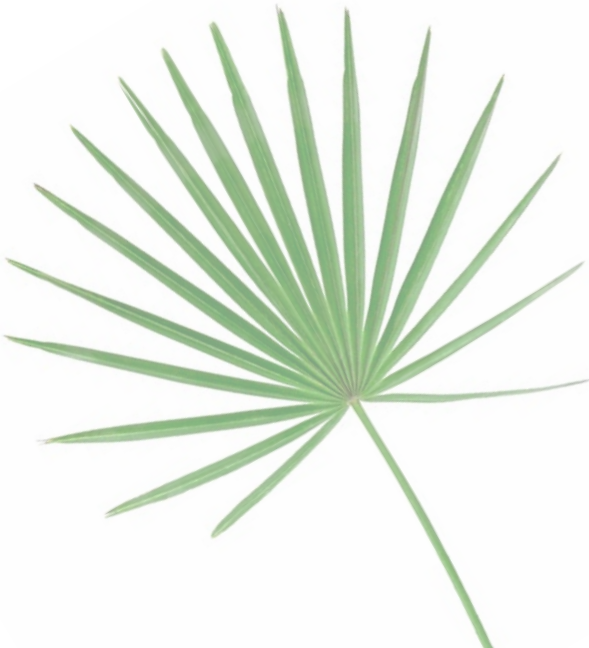
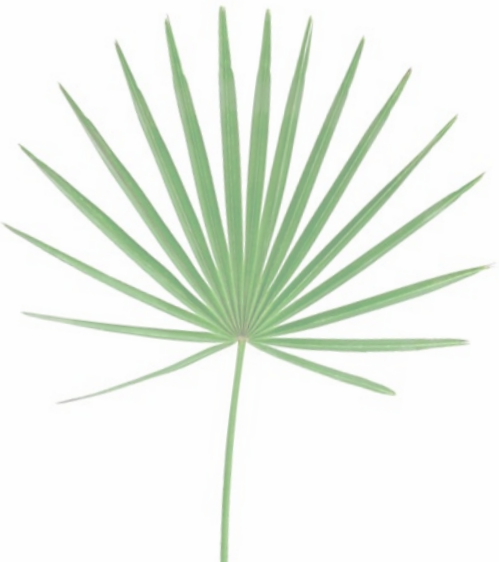
1. **Pathways and Walkways:** Illuminate pathways and walkways with taller lanterns to ensure safety and guide visitors through your garden. Contrast with low-level lighting to create a subtle and inviting glow.
2. **Focal Points:** Highlight key features such as sculptures, water features, or architectural elements with spotlights or uplights. This draws attention to these elements and adds visual interest to your garden.
3. **Seating Areas:** Create a cozy and inviting atmosphere in seating areas with soft, ambient lighting. String lights, lanterns, or wall-mounted fixtures can provide a warm and relaxing glow.
4. **Plants and Trees:** Use lighting to accentuate the natural beauty of your plants and trees. Uplighting can create dramatic effects, while downlighting can mimic the natural light of the moon.
5. **Water Features:** Illuminate water features such as ponds, fountains, or waterfalls to create a magical and serene ambiance. Submersible lights can be used to highlight the movement and reflections of the water.

Thoughtful lighting design can transform any garden into a beautiful and functional space. By avoiding common mistakes and carefully considering where to place your lights, you can create a garden that is both visually stunning and practical. Whether

you're looking to enhance your outdoor living area, highlight key features or create a tranquil retreat, the right lighting can make all the difference.

<https://www.williamsugg.co.uk>

Show Garden at RHS Chelsea Flower Show by Robert Myers Garden Design featuring Heritage Lantern by William Sugg – photographed by Richard Bloom



Lighting or Fighting for Life

The Green Mascots we keep setting up to fail

Corinne Courtney

Biophilic design is everywhere – in hospitals, classrooms, tech offices, wellness centers, and lounges adorned with wood ceilings and framed natural views.

Flooring grounds us in earth tones.

Ice-blue drapes ripple like ocean breezes.

Materials whisper nature's language.

And then there are the plants.

Our green mascots. Living emblems of vitality. We showcase them. We cite the research. We know they reduce cortisol, cut absenteeism, and improve creativity.

They *do* all that – when they're alive. But many of them are not.

The Dirty Secret of Green Design – Plants Are Struggling

Most plants in commercial interiors aren't thriving – they're hanging on.

We recycle the same pothos, snake plants, and ZZs because they can survive low-light, low-care, low-budget conditions. Not because they look amazing. Because they're hard to kill.

Meanwhile, office lighting rarely exceeds 400 lux. Plants need at least

800, and many want 1,000–2,000 lux to function well.

We mistake “not dead” for “doing fine.” It's like malnutrition in a child – slow, invisible deterioration. When pests show up or leaves brown, the decline has already been in motion for weeks.

When plants fail in a space claiming wellness, it's a design failure – and a form of greenwashing: where sustainability is promised, but the conditions silently betray it.



From Sustainability to Regeneration

Biophilic design isn't decorative – it's systemic.

Where LEED pushed us to reduce harm, and WELL taught us to measure outcomes, biophilic design goes further: designing for ongoing life. For people *and* plants.

As *14 Patterns of Biophilic Design* puts it, it's about reconnecting people with “natural systems and processes in the built environment.”¹

Not just looking green. Living green.

What Plants actually do for us

The data is clear:

- **+15% productivity** in biophilic offices (University of Exeter)²
- **+45% creativity** in nature-rich environments (Human Spaces Report)³
- **10–15% fewer absences** with greenery on site (WELL/IWBI)⁴
- **Reduced presenteeism** – less burnout, more focus⁵

Now compare the cost: a well-lit, maintained plant program often runs less than replacing one disengaged employee.

Why is proper plant lighting still an afterthought?

The Light that never comes

Here's the quiet conflict: the systems designed to save energy often hurt the plants we use to showcase sustainability.

Motion sensors turn off lights when we leave. But plants don't leave.

Low-e glass keeps out UV – and also the wavelengths plants need to photosynthesize.

It's like giving a thirsty traveler non-alcoholic beer. Looks right. Doesn't deliver the same punch.

Biophilic lighting isn't inefficient. It's *aligned*. And when done well, it supports both ecology and energy goals.

Designing for Biology, not just Beauty

We spec the plants. We shoot the photos. But we rarely check the lux at the canopy, budget for long-term care, or sync lighting to biological need.

Meanwhile, the plant industry works overtime to adapt. Horticulturists adjust soil, rotate species, tweak placement – and still, when something fails, they're the first to be questioned.

“Corinne, I have never been given a space even close to ideal conditions,” a horticulturist told me, referencing Associated Landscape Contractors of America's 2003 landscape specs – a standard that rarely survives Value Engineering rounds.⁶



As biophilic design becomes the default aesthetic, a new challenge emerges:

How do we accommodate the divas – the stunning, high-impact species designers love – without creating sick, decaying spaces?

These plants are worth it – but they require real strategy. The solution isn't avoidance. It's integration:

- Thoughtful placement
- Lighting design that works with biology
- Communication between teams

Designers don't need to be horticulturists. But plant experts and horticulturalists *do* need a seat at the table early enough to help set the conditions for success.

This isn't about blame. It's about design maturity – and shared responsibility.

Lighting as Life Support

Lighting isn't just ambiance. It's infrastructure. It's how we:

- Simulate natural rhythms
- Hit the lux targets for health
- Balance energy savings and photosynthesis

As *The Economics of Biophilia* makes clear: even modest biophilic investments yield outsized returns – in cognition, comfort, and retention.⁷

The Real ROI: Regeneration

Plants don't take PTO (Paid Time Off). They don't complain. They stay rooted – in whatever conditions we leave them in. And in return? They clean our air. Lower our stress. Anchor our spaces in life.

So, let's stop designing for nature as concept and start designing for nature as collaborator.

This isn't about perfection. It's about commitment – to care, to communication, to better systems.

Because design isn't just what we show. It's what we sustain.

<https://www.biofiliate.com>

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ENVIRONMENT PEOPLE PLANET



WHEN THE LIGHTS STAY ON – HOW WE ARE UNBALANCING NATURE

“From disoriented migrations to fatal collisions and disrupted feeding, artificial light is quietly but devastatingly altering the lives of birds and the ecosystems they depend on.”

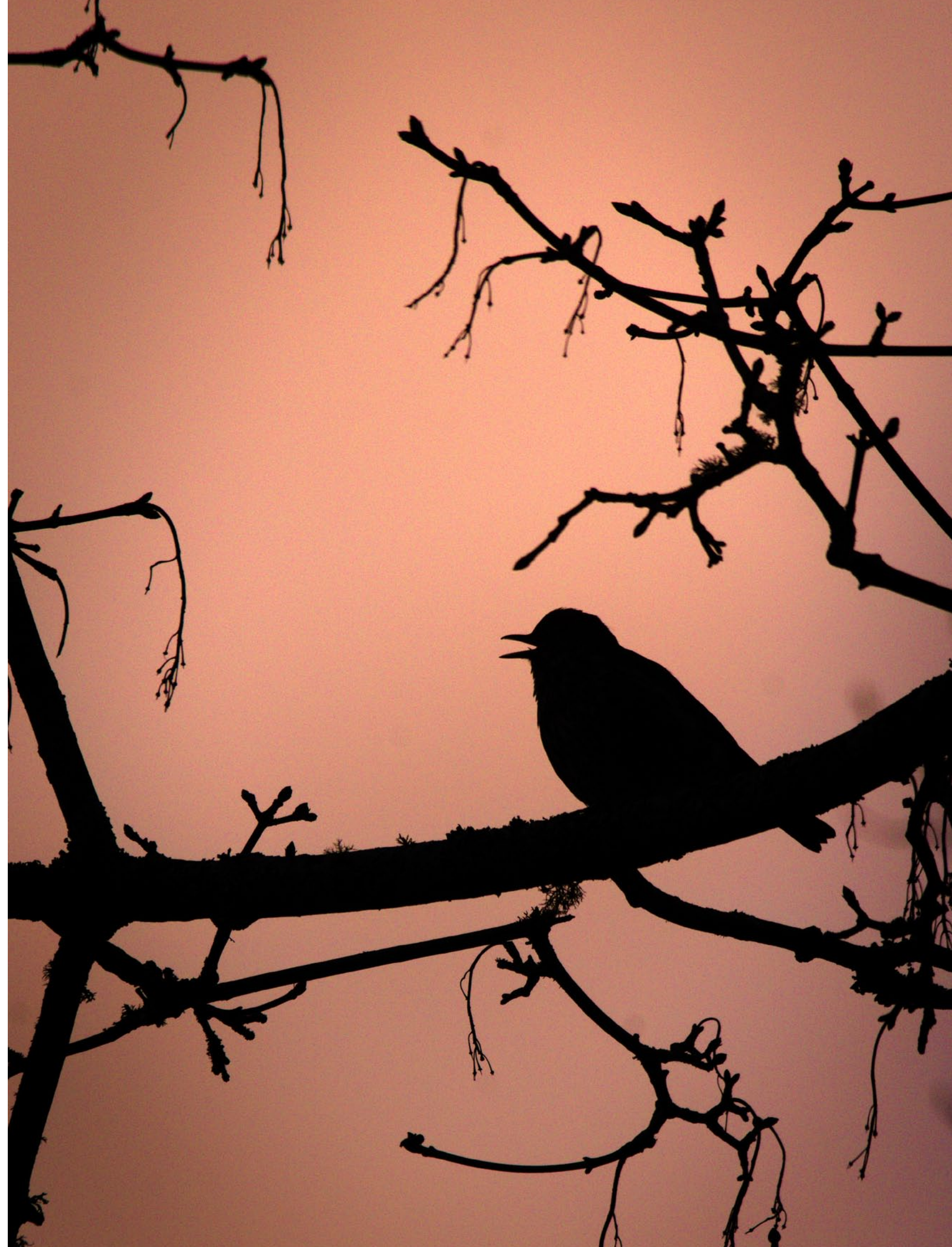
RSPB's Lou Mahon

For many of us, the idea of birdsong is synonymous with first light, particularly at this energising point in the year when daylight hours gradually but unmistakably lengthen and some of us creak out of bed early enough to appreciate nature's greatest symphony, the Dawn Chorus (with Dawn Chorus Day this year falling on May 4).

But whilst the link between spring's burgeoning brightness and birds' innate drive to attract a mate through birdsong is strong, the broader relationship between light – in all its forms – and birds is more complex (with even the Dawn Chorus itself in some instances influenced by

artificial light forms as well as natural sunlight).

Artificial illumination – such as the omnipresent street lights of urban areas, for instance – can trick birds into thinking that the days are longer. The impacts of this are complex, generating both positive and negative effects that vary from species to species. Artificial light disrupts birds' natural circadian rhythms (which determine when they are active and when they are sleeping) - for some species this disruption can also allow them to feed for longer periods. Similarly, birds may sing for longer in artificially lighted environments, but the additional exertion this requires can cost them vital energy.





There is also evidence to suggest that light pollution can for certain bird species disrupt behaviours like migration, which happen on an annual cycle. For many migratory species, their incredibly long journeys are triggered either by the increase in daylight hours that signals spring, or the lengthening darkness that autumn brings. Whilst other factors like temperature and hormone release can also have a bearing on when birds initiate migration, there is a danger that the presence of artificial light sources can prompt migratory birds to leave overwintering sites too early (and equally, depart summer breeding grounds too late) to survive.

Furthermore, [these findings](#) in the U.S. from our BirdLife International partner, The National Audubon Society, have

shown the more immediate dangers that artificial lighting in urban areas can pose to migrating birds. Their research examined migratory species who fly at night, usually relying on the nighttime sky to orientate themselves, much like early human navigators did. These birds are particularly susceptible to the lure of artificial lights in cities and towns, often being drawn into beams of light, in which they rapidly become tired, disorientated and unable to relocate their migratory path. Consequently, this can mean birds are much more vulnerable to collisions with nearby buildings. Tragically, in 2017 a sad instance recorded the deaths of almost 400 birds, having collided with windows after being caught in the floodlights of a 32-story skyscraper in Texas.



Similarly, nocturnal bird species can be particularly sensitive to artificial light, as it impacts both when they are awake and how they behave. Birds such as shearwaters can be adversely affected by light pollution because they rely on the cover of darkness to safely enter their nesting sites. The findings of this study (co-authored by RSPB, BirdLife Malta and the University of Giessen) suggests that Yelkouan Shearwaters off the coast of Malta avoid entering their colonies when they are brightly illuminated by the artificial lighting provided for nearby ships refueling at sea, as they depend on the cover of darkness to avoid predation. With the birds forcibly not able to return to their colony due to a lack of darkness,

they may consequently not be able to feed their chicks as regularly as needed.

Closer to home, [Scottish research](#) examining how the Manx Shearwater is affected by both light and weather, drew conclusions showing that artificial light from the coastal village of Mallaig was contributing to the crash-landing of young birds near their nesting sites. Once grounded in urban areas, these disorientated shearwaters find it near impossible to take off, due to an anatomy that favours diving into water for food, with legs set far back on their bodies. Instead, these urban-grounded fledglings are rescued by human intervention, and later released out at sea in hope of preventing further groundings.

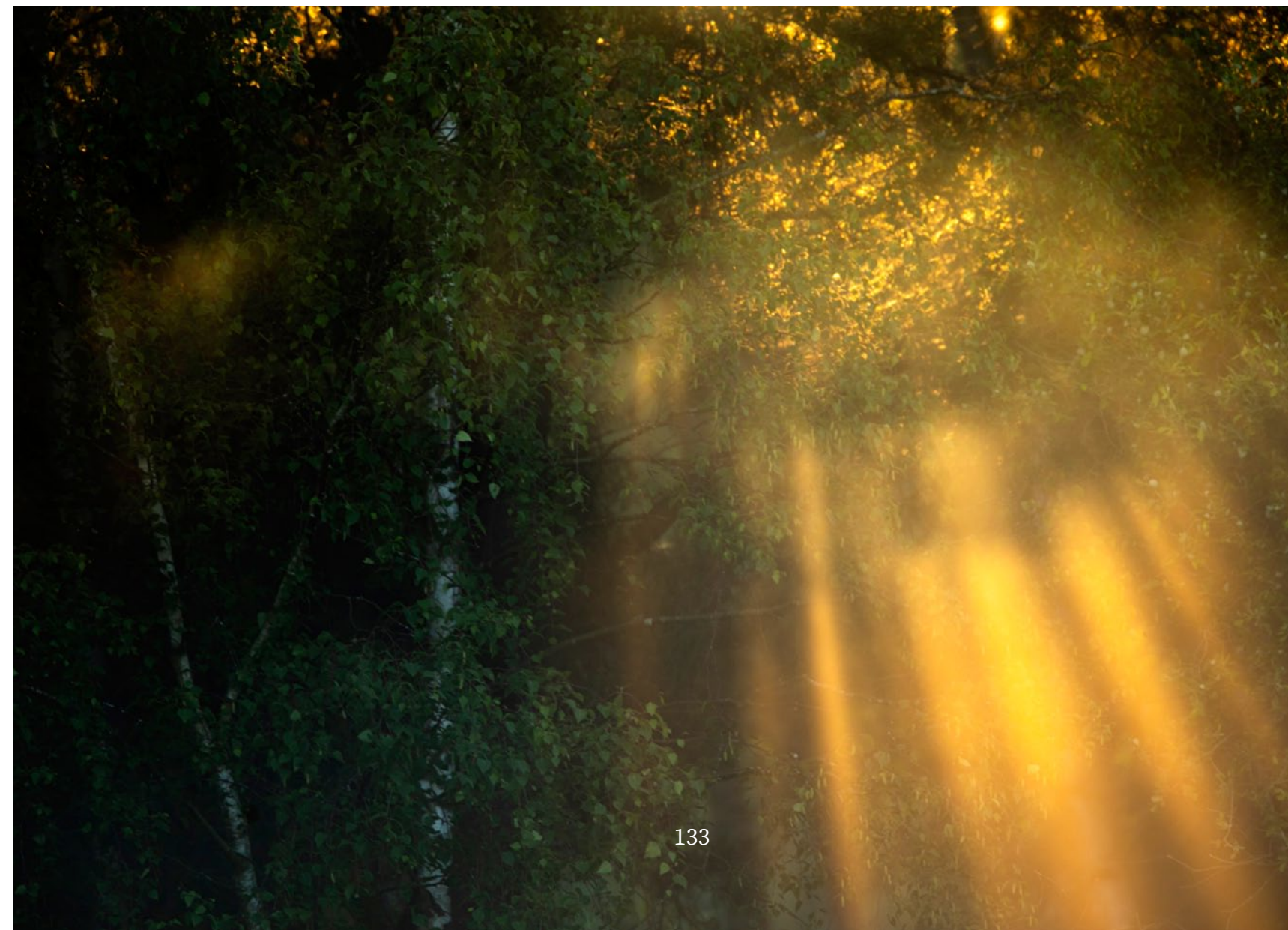
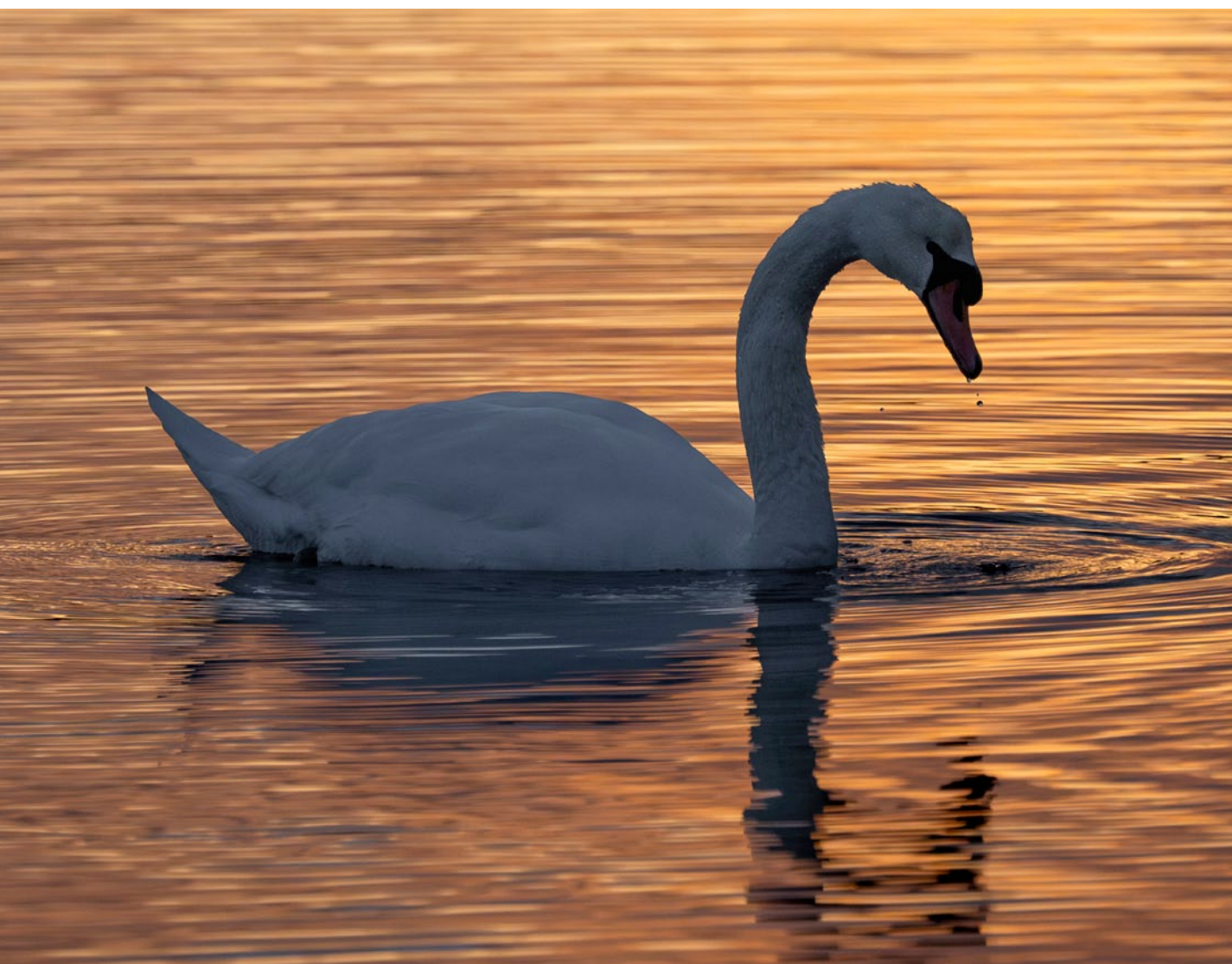


Any consideration of the interplay between light and bird species should also take into account wider biodiversity impacts. **2021 research** from Butterfly Conservation, the UK Centre for Ecology & Hydrology and Newcastle University (lead by Douglas Boyes) showed that streetlights in southern England reduced the abundance of moth caterpillars in grass verges by one third (33%) and in hedgerows by almost half (47%), compared to comparable unlit roadside habitats. With many of our bird species depending on caterpillars as a food source (particularly when feeding their young), the research highlights how vital the need is to regulate sources of

artificial light in order to promote and protect biodiversity as a whole.

As shown by these studies, it's important for us to think carefully when installing artificial light sources. Whether you are homeowner, designer, developer or a resident contacting the council, take a look at available resources on how to reduce the impacts of artificial lighting. If you're not sure where to start, Bat Conservation Trust has some guidance here: <https://www.bats.org.uk/our-work/buildings-planning-and-development/lighting>

[rspb.org.uk](https://www.rspb.org.uk)



Letting Nature take the Lead

*“To weave together the landscapes of human
and nature for the benefit of both.”*

Alexandra Bowen

I never thought a plant could change my life.

I was raised in the mountains and on the sandy beaches of Oahu, Hawaii. When I first moved to the mainland from Hawaii, I felt a sense of loss I couldn't quite explain. In Oahu, I had been surrounded by the pulse of the natural world – ocean waves humming against the shore, the rustle of trees in the trade winds, the sweet scent of plumeria floating in the air. But here, surrounded by concrete and steel, I felt the absence of nature acutely. It was more than missing the scenery; it was as if I had been disconnected from a vital part of myself. I now know there's a term for it – “green withdrawal.”

At first, I tried to adapt. I walked city parks, sought out botanical gardens, and even made a habit of utilizing public parks and outdoor spaces. But it wasn't until I started gardening and taking care of plants something inside me shifted. Watching leaves and buds unfurl day by

day, I began to understand that Biophilia isn't just about big forests or sweeping landscapes; it starts with the smallest of connections.

Those little plants became the catalyst for something much larger. I went on to study Environmental Design, driven to design and ensure our spaces – our homes, our cities, our workplaces – were more connected to nature and how we connected to nature in the past. I learned that nature isn't just something to be admired from a distance; it's an integral part of our health. Exposure to natural elements reduces stress, improves cognitive function, and even strengthens community bonds. I saw many examples firsthand traveling around the world on how green roofs and living walls transformed dull, uninspiring environments into vibrant ecosystems, how daylight streaming into a room could lift people's moods, and how integrating plants into urban planning could clean the air and cool our cities.





Biophilic design is not just about aesthetics – it’s about creating spaces that respond to our innate need for nature. It’s about designing homes that breathe, offices that energize, and cities that embrace the natural rhythms of life. Every choice we make – from the materials we use to the layouts we craft – can either deepen our bond with the natural world or sever it further.

In the last 70 to 80 years, the way we interact with the land and how we develop the places we work, live, generate energy, grow food, and produce products have dramatically shifted in a way that disconnects us from nature, creates significant costs and challenges, and reduces our quality of life. The result is both a set of compounding social and environmental issues and an opportunity to create immense economic and social value if we take a different approach.

I am not just talking about ‘green’ development, sustainable agriculture, or renewable energy. These and other good strategies are being done in many places – but they are being done in isolation. We are talking about Biophilic informed development – understanding the land in any particular place and designing how we live, work, and produce the things people need to survive in ways that listen to and learn from that particular natural landscape. This approach can unlock the economic, social, and environmental opportunities of our time.

This understanding led me to create the **Biophilic Design Community** in 2017, because I needed a space to document inspiring projects from around the world - to have hope. At its heart, this community was born from hope. I saw so many disheartening things – polluted waterways, concrete jungles, declining pollinators, and

a growing detachment between people and nature. I wanted a way to re-connect with my passion and connect with others who shared my passion - as a reminder that we are not alone in this fight to restore the balance between the built and natural worlds.

Plants are not black and white they’re green. It’s not an exact science and there’s beauty and resilience in that. In the same way, we can’t be overly prescriptive with applying nature-based solutions. One of the most profound lessons I’ve learned from Biophilic design is the value of slowness. In a world that glorifies speed, nature moves at its own steady pace. A tree does not rush to grow; a seed does not bloom overnight. There is wisdom in that patience, a lesson in resilience. By starting from seed, we learn to appreciate every step of the process – the waiting, the nurturing, the unexpected turns. This mirrors how we must approach sustainability and urban planning: with intention, observation, and a willingness to learn from the land rather than impose upon it.

We are at a pivotal moment. The way we develop our cities, produce our food, and interact with the environment has profound consequences on our health and well-being. But within these challenges lie immense opportunities. By embracing Biophilic design, we can create spaces that nourish both people and the planet. We can move away from isolated solutions and instead take a holistic approach that values ecological, social, and economic well-being as interconnected forces. I believe in an Ecomorphic design ideology. The term Ecomorphic describes buildings that mimic natural systems and reconnect people to [the spirit of] nature. Similar to the spirit of a place, “genius loci.”

Natural resources are becoming economic drivers in ways that they have not been in the past. Yet the other side of this very real challenge is a huge opportunity for those who recognize it and meet the growing long-term demand for reliable and sustainable clean energy, food, and water. I am concerned about the quality-of-life implications of biodiversity loss, climate destabilization, water pollution, and resource depletion that we see as consequences of our current industrial and development practices. I see the real impacts of these practices every day and in nearly every community – from the depletion of aquifers and contamination of freshwater resources, caused by industrial irrigation practices and antiquated storm/wastewater management, to the paving of agricultural soils, caused by economic and regulatory incentives that drive sprawling, low-density real estate development.

Biophilic development is made up of a deep, philosophical belief that healthy, productive, stable natural systems are at the core of most value creation on the planet – they are the foundation of food we eat, water we drink, energy that fuels our communities, and materials in every product we use. Where and how we live matters and impacts the quality of our lives and our very health. Our current development patterns create communities that are disconnected from nature, reinforce a sedentary lifestyle, make good food expensive and unhealthy food cheap, and degrade the quality of the water we drink and the air we breathe. Conventional approaches to agriculture, energy, manufacturing, and other industries concentrate toxins and chemicals in our environment and raise additional concerns for our health. We are not only disconnected from nature, but we are also increasingly disconnected from each other with the distances between home and work, lack of walkable communities, and degraded sense of place all contributing to greater isolation and a loss of family and community time.

We, right now, have the opportunity to shift the very mechanism that has caused severe environmental and economic equity damage – human development patterns that ignore and extract from nature – to the mechanism that restores environmental health and builds stronger communities. I see this, not as utopian idealists but as seasoned investors, large-scale developers, asset managers, and scientists who recognize the power of merging an environmental imperative with a business opportunity. Learning from the land and environment, through the practices of Biophilia and Biomimicry approaches will aid in the success of this sustainable ideology. By observing the patterns and processes of nature, we can conclude that there are many lessons to learn about the fit between humans and the environment.

We must recognize that nature is not an optional feature – it is essential. Our spaces must not only function but also inspire, heal, and reconnect. We must advocate for policies that prioritize green spaces, push for materials that are regenerative, and craft environments that bring the outside in.

We often speak about nature as something separate from us, but the truth is, we are nature. The plants, the trees, the rivers – they are not just resources to be used but “family” to be protected. Biophilia, at its core, is about love – love for the living world and for each other. If I can get someone to care about the plant on their desk, perhaps I can get them to care about the vast, intricate ecosystem that sustains us all - the big plant we live on. And maybe, just maybe, that love will inspire them to fight for its future.

Alexandra Bowen is Founder & Designer of The Biophilic Design Community on LinkedIn

biophiliadesign.org

One Planet Living

Creating communities that thrive with nature

Philippa Hoy

Truly sustainable communities don't just reduce harm, they help people and nature thrive together. As someone who works closely with developers, architects, and community groups, I've seen firsthand how the One Planet Living® framework provides both the vision and the tools to turn this aspiration into reality.

As we grapple with the twin crises of climate change and biodiversity loss, it's clearer than ever that sustainability must go beyond checklists and targets. It has to be felt in the way places are designed and lived in. That's where biophilic design comes in and why it aligns so naturally with One Planet Living.

What is One Planet Living?

One Planet Living is Bioregional's practical framework for creating sustainable communities, based on ten principles – from zero carbon and zero waste to sustainable food, equity, and health and happiness. It's rooted in our work on the pioneering BedZED eco-village in south London. Used around the world, the framework

helps organisations, developments, and communities reduce their ecological footprint and operate within the boundaries of one planet, rather than the current European per person average of 2.8 planets!

The framework is intentionally open and free for anyone to use. We provide detailed guides, tools, and a growing library of case studies to help bring it to life. Whether you're working on a new housing development, a neighbourhood retrofit, or a tourism destination, you can use the One Planet Living framework to shape a better, more connected way of living.

One of our most exciting recent resources is our 2025 publication, *“Goals and guidance for new-build communities in the UK”*. It gives practical advice for aligning residential development with One Planet Living – covering climate action, circular economy, nature recovery, and wellbeing. It also includes guidance on incorporating biophilic elements like green infrastructure, tree cover, and nature-connected public spaces to support both ecological and human health.

The importance of biophilic design in One Planet Living

There's a natural synergy between One Planet Living and biophilic design. Many of our principles – especially *Land and nature*, *Health and happiness*, *Culture and community*, and *Local and sustainable materials* – are directly supported by biophilic strategies.

For us, biophilic design is about making One Planet Living tangible. It helps people feel emotionally connected to their surroundings – by celebrating natural materials, fostering access to green spaces, and supporting biodiversity in everyday settings. It's one of the most powerful ways to make sustainability visible, sensory, and impactful.

One Planet Leaders bringing biophilic design to life

Truly outstanding sustainable developments can apply to Bioregional to be reviewed and recognised as a Leader, or even a Global Leader, in One Planet Living. Here are some examples of **One Planet Living Leaders** that fully embraced biophilic design to enhance sustainability outcomes and human connection.

Villages Nature Paris, France

Villages Nature is a large eco-tourism resort near Disneyland Paris, developed by Euro Disney and Groupe Pierre & Vacances. Recognised as a Leader in One Planet Living, the resort is structured around five themed 'worlds,' each celebrating a different aspect of human-nature connection.

Biophilic design is central: from green roofs and vertical gardens to geothermal lagoons and extensive woodland trails, nature is not an afterthought but the heart of the experience. The resort's architecture mimics natural forms and integrates with the landscape, encouraging visitors to slow down and reconnect with nature. It's a destination that educates and inspires without ever feeling like a lesson.

Grow Community, Bainbridge Island, USA

Located just outside Seattle, Grow Community was designed to support net-zero lifestyles through solar energy, walkability, and shared resources. But it's the biophilic touches that really bring it to life: edible gardens, tree-lined paths, and communal green spaces that nurture both environmental awareness and community spirit.

WGV at White Gum Valley, Australia

This Global Leader project in Fremantle applies One Planet Living principles to reimagine medium-density living with a “landscape-first” approach. Set on a former school site, WGV retained and expanded existing green corridors, creating a rich public realm where nature leads.

The design integrates green infrastructure such as community gardens, stormwater swales, and rooftop solar arrays. Social cohesion is fostered through biophilic elements like shaded seating areas under existing eucalyptus trees and buildings arranged to maximise views of nature and access to daylight.

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Designing for the ten principles

Biophilic design contributes meaningfully across all ten of the One Planet Living principles:

- **Health and happiness:** Access to nature improves mental and physical health.
- **Equity and local economy:** Natural, shared spaces invite inclusive use and foster local identity.
- **Culture and community:** Gardens, green spaces, and communal natural environments bring people together and build social capital.
- **Travel and transport:** Walkable, bike-friendly designs enhance physical engagement with the environment.
- **Land and nature:** Biodiverse landscapes and green infrastructure support local ecology.
- **Local and sustainable food:** Edible landscaping and urban agriculture connect people to food systems.
- **Water:** Rain gardens, bioswales, and water-sensitive landscaping help conserve and purify water.
- **Materials and products:** Use of natural, local, renewable materials reduces embodied carbon and enhances sensory experience.
- **Zero waste:** Composting systems, reuse of natural materials, and thoughtful design reduce landfill waste.
- **Zero carbon energy:** Natural ventilation and daylight reduce energy needs.

A shared vision for regenerative living

At Bioregional, we know that creating sustainable communities isn't just about technology or regulation – it's about designing places people love to live in. Places where they feel connected to nature, to one another, and to the wider systems that support life on Earth.

One Planet Living offers the structure to guide that journey. Biophilic design brings it to life in the places we see, touch, and inhabit every day.

We invite anyone - planners, developers, designers, and citizens – to explore the framework, use our free tools, and join a growing global network working toward a future where people and planet thrive as one.

Philippa Hoy, One Planet Living Lead at Bioregional, creators of the One Planet Living® framework. *Bioregional is an award-winning sustainability consultancy and registered charity dedicated to helping organisations deliver practical solutions for sustainable living.*

<https://www.bioregional.com>





The School of Biophilia

At the school of Biophilia we are passionate about establishing the relationship between nature, the built environment and human centric design.

Did you know? only 24% of schools provide daily opportunities for pupils to experience nature.

The Vision

Imagine a school where children learn to read the landscape as fluently as they read books. Where mud and moss are as valued as maths and music. Where curiosity grows like ivy, and students don't just learn about the natural world – they belong to it.

This is the School of Biophilia: an institution and a movement.
Where nature meets knowledge.

Our mission is simple but urgent: to re-root education in the living world.
To help teachers, schools, and communities reconnect children with nature – not as a side activity, but as the foundation of learning.

What We Do:

We're not building a single school – we're cultivating a network.

The School of Biophilia offers flexible resources that can be adapted to any age or curriculum, including:

- Lesson plans aligned with nature-based themes
- Teacher guides and support materials
- Hands-on workshop structures
- On-the-ground help to get initiatives started

Whether it's a nursery building dens or a secondary class growing a sustainable shelter, we provide the inspiration and the tools. Schools don't need to reinvent the wheel – they just need to roll it onto the grass.

Why Now?

In a time of climate breakdown, digital disconnection, and rising anxiety in young people, the answer isn't just smarter tech or more tests. It's belonging. Biophilia – the innate human connection to nature – isn't a luxury. It's a survival instinct.

And if we teach it early, we grow not just environmental awareness, but resilience, creativity, and care.

Where nature meets knowledge

What if our education system was as alive, curious, and interconnected as a forest?

An institution and a movement.

Where nature meets knowledge.

Teaching biophilia – from nursery to practice.

A place to learn, grow, and reconnect with the natural world.

What if we taught children that the earth is not just a resource, but a relative?

What if our classrooms opened not just to books, but to birdsong?

What if reconnecting with nature wasn't an extracurricular activity, but the curriculum itself?

This is the spirit of the School of Biophilia. Not a single building or program, but a living network of ideas, people, and practices. It's rooted in the belief that the ecological crisis is also a crisis of relationship – and that healing starts in how we teach.

What if children grew up not just learning about nature, but with it – in relationship, in reverence, in real connection?

We exist to help schools bring nature into learning – not just on forest days or field trips, but into everyday lessons, rhythms, and relationships.



We provide the things that make it easy to start:

- Nature-based lesson plans and teacher guides
- Workshop ideas and support
- Help with setup and integration into existing curricula

Whether you're working with toddlers or teenagers, there's a way to weave biophilia into the classroom – and we'll help you find it.

Examples in Action:

In one workshop – Denology – children explored how animals create shelter, then built their own dens from found natural materials. It was messy, joyful, and full of problem-solving.

In another, called Could You Grow Your Own Home?, students looked at sustainable architecture, thinking through how humans can live more like ecosystems.

We're developing language lesson plans – in French and German, for example – where students learn vocabulary through the world around them: trees, weather, birds, landscapes. They might describe a walk through a forest in German or French.

Or in maths, we've explored how patterns in nature – like spirals, symmetry,

fractals – can become entry points into geometry, ratios, and sequences.

Every subject becomes richer when we teach it through a living, breathing world.

These aren't just nature activities. They're invitations to see the world – and ourselves – differently.

Let's Collaborate:

We'd love to connect with schools, educators, and curriculum designers ready to try something different. Let us help you bring the outside in – and the inside out.

If you're curious, inspired, or want to learn more, we'd love to talk.

We want to support you to make this real. Whether you want a workshop, a full curriculum rethink, or just a conversation to spark ideas, we're here.

Because honestly – once you see it, you can't unsee it.

Education rooted in nature just makes sense.

And maybe you'll walk away thinking, "Oh my word. Yes. What a good idea."

The School of Biophilia
<https://biophiliaschool.create.net>





Journal of Biophilic Design
ENVIRONMENT, PEOPLE, PLANET



The School of Biophilia - Portraits in Nature



You will need:

- Mirror to recreate your reflection
- Foraged nature
- Paper or card
- Scissors and glue

Learning Outcome:

- To explore creating self-portraits using different materials

Activity:

- Start with taking a walk to collect items of nature. Discuss textures and senses during this time.
- Show pupils how to use the mirrors to identify features, talk about the process of how different elements of nature can be used e.g. I am using grass for my hair because it is long and my hair is long

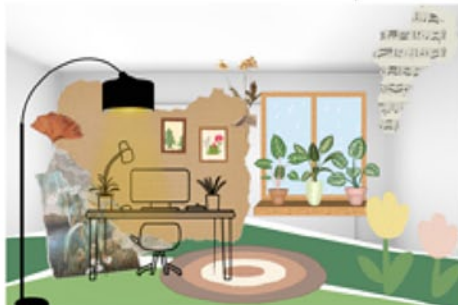


Benefits of this activity:

- 30 minutes in nature can reduce stress, anxiety and even ADHD symptoms!
- Boost mood and concentration
- Fosters creativity and problem solving
- Develop this activity by asking pupils to create a portrait of someone else
- Improve self awareness and creativity when talking about your own features
- Discover independence when sourcing nature elements



The School of Biophilia - Biophilic Classroom Collage



You will need:

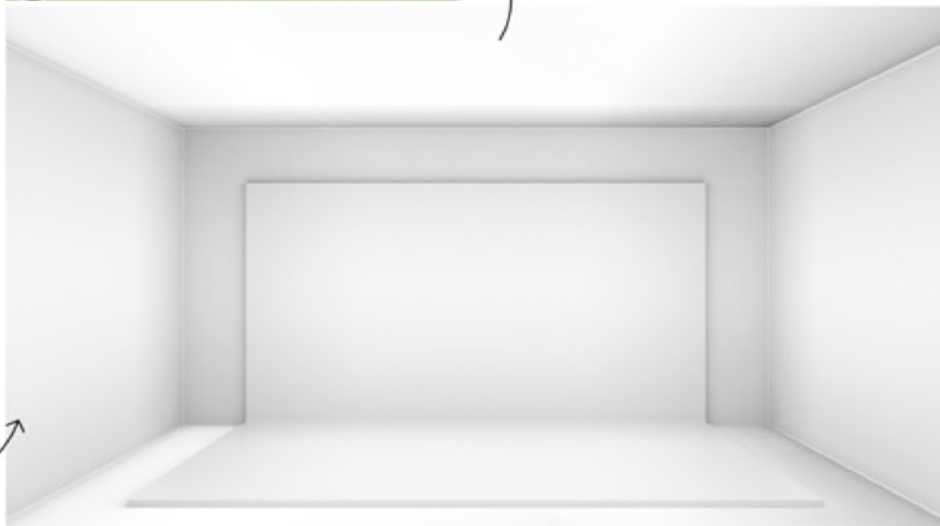
- Scissors
- Glue
- Pens & pencils
- Stickers
- Pictures of nature
- Small nature finds such as petals

Learning Outcome:

- To identify areas of a classroom that could be improved through the use of nature

Activity:

- Take Classroom Picture 1 and ask pupils about what they see, what they like, what they dislike.
- Using stickers, pictures, shapes and small nature finds such as petals create a Biophilic Classroom Collage!



Benefits of this activity:

- Encourage independence and creativity whilst creating a Biophilic Classroom
- Have a greater understanding of what each pupil likes and how you can implement different aspects of this into your own classroom, such as pictures of trees on the wall, plants and coloured lighting



The School of Biophilia

WHERE NATURE MEETS KNOWLEDGE

ABOUT US

AT THE SCHOOL OF BIOPHILIA WE ARE **PASSIONATE** ABOUT ESTABLISHING THE **RELATIONSHIP** BETWEEN **NATURE**, THE **BUILT ENVIRONMENT** AND **HUMAN-CENTRIC DESIGN**

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KEY INITIATIVES

BRIDGE THE GAP

Our easily downloadable resources will begin to bridge the gap within current UK curriculum between education and nature

MAKE A CHANGE

Introducing nature into education supports the mental and physical well-being of both students and teachers

BIOPHILIA REVOLUTION

Partnering with designers, educators, professionals and parents to expand the curriculum and knowledge around Biophilia and education



HOW MANY MOTHS DOES IT TAKE TO CHANGE A LIGHTBULB?

Sophie Hall

“Every year, global light pollution rises by 10%, drowning the night in artificial glare; but we can reclaim the darkness with a moon meadow of our own.”

Every year, the night sky gets lighter. Global light pollution is increasing by 10% annually, including direct lighting from artificial light sources, such as streetlamps and lit signage, and the resulting skyglow. And while lighting plays an important role in our built environment, including aiding safety, light pollution can be harmful to our health and to the health of our wildlife, too.

Insects like moths are particularly affected. Moth numbers have fallen by over a third since the late 1960s, with light pollution an important driver in their decline. Butterfly Conservation research shows that moth caterpillar numbers under LED streetlights were 52% lower in hedgerows and 43% lower on grass verges compared to those which were unlit. Most of the UK's moth species are nocturnal and fly at night, and light pollution disrupts their natural behaviour in a number of ways. Many moths are naturally drawn to sources of light, so artificial lights can disorient, trap or exhaust them. Moths that are drawn to artificial light may spend less time or have less energy to find food or to breed, and they may be more vulnerable to predators. Some moth caterpillars and their foodplants are also attracted to light, taking them away from food sources and towards potential predators. Light can even change the plants caterpillars rely on for food. Some studies suggest that artificial light may alter the plants' nutritional value which may affect how well the caterpillars who eat it develop. This means that even day-flying species in their caterpillar stage could be threatened by light pollution.



But why care about moths? Moths are often pictured as dull brown fluttery things that eat clothes, but there are over 2,500 species of moths in the UK, with only a handful of species which eat natural fibres, and they are anything but dull. From giant, pink moths to tiny, iridescent moths, moths that mimic hornets and moths with no wings – moths are incredibly diverse, and they have an important role to play in our ecosystem. Moths and their caterpillars are an important food source for lots of other species of wildlife. They're also vital pollinators of a variety of species of plants, from flowers to food crops. They are even capable of pollinating more efficiently at night than their day-pollinating equivalents like bees and butterflies. A future with fewer moths also means a future with fewer birds, mammals, plants and countless other wildlife which relies on them. Light pollution threatens whole ecosystems.

The evidence so far shows that darkness is best when it comes to protecting moths. However, lighting is an important part of our society, our communities and our culture, and lighting design needs to be sensitive to the needs of both people and wildlife. Fortunately, there are simple steps which businesses, public bodies and individuals can take to dim the dangers of light pollution for moths without compromising on public safety or necessity:

Reduce – Where you have external lighting in gardens, grounds or other

premises, use motion sensors or timers to reduce the amount of time lighting is in use, making sure it's only on when needed. You can reduce the intensity of your indoor lighting with dimmers and reduce light spilling out by closing your curtains or blinds at night. You can also reduce the number of lights you have, using only those which are needed.

Replace – Switch lightbulbs to warm coloured ones. Choose warm-white or amber LED over cool-white or blue-white lights, as warmer light has generally less impact on nocturnal insects like moths. See our guide to lighting on page X

Redirect – Add shielded light fixtures to redirect light down and prevent it spilling upward or too far outward and avoid directing light at areas of habitat for moths.

Remove – Where a light is unnecessary, remove it!

As well as making changes to lighting, another way to support moths is by creating areas of suitable habitat for them at home, in our communities and across our businesses. Moon Meadows are spaces of any size filled with plants which benefit nighttime pollinators like moths and lit (or not lit) in a way that is moth friendly. Whether it's a single planter, a space in a car park, or a large green area in a park, if it's filled with plants which support moths, and has moth-friendly lighting, it's a Moon Meadow.





When it comes to choosing plants for a Moon Meadow, it's important to consider moths' needs at different stages of their lifecycle. Adult moths need nectar, so flowers like Common Jasmine, Honeysuckle, and Evening Primrose are great options for this – several of these plants even produce scent at night in order to attract pollinators like moths. Moth caterpillars need plants to eat but can be quite picky when it comes to their tastes. Some common options to include are Fuchsia, Marjoram and Common Bird's-foot-trefoil, but it's also a good idea to look at which common moth species might be in your local area and finding their foodplant – you can check out Butterfly Conservation's moth pages for more information butterfly-conservation.org/moths.

Another way to create a Moon Meadow is to leave a patch of grass to grow long – several species of moth caterpillar feed on grasses, and adults drink nectar from the

wildflowers which pop up in these long patches. Creating a hedge using native species like Blackthorn, Hawthorn, Hazel, Privet and Willow will also provide food and shelter for moths at different stages of their lifecycles.

However you create a Moon Meadow, it's important to ensure that it stays pesticide free, as herbicides and insecticides will harm the insects it's there to help. It's also crucial to use peat-free compost when planting, as peatlands are important habitats for many moths and other wildlife.

For more information on moth-friendly lighting and how you can make a difference, check out Butterfly Conservation's Moon Meadows guide at [Make a moon meadow \(https://butterfly-conservation.org/join-the-dark-side\)](https://butterfly-conservation.org/join-the-dark-side)

<https://butterfly-conservation.org>

[Make a moon meadow](#) for more info on light pollution in particular.



WELLBEING



Shining the light on circadian rhythms

“Since the Industrial Revolution, much of the Western and developed world has succumbed to the belief that we no longer need nature and that it plays no significant role in our lives. This disconnection has led to long-term environmental harm and a host of chronic health issues for us all.”

Chintamani Bird

My pillow leans against the car door, and though my eyes are shut, I’m surrounded by light. I’m in the back seat of Dad’s car, embarking on a twelve-hour drive back home from Queensland to the western suburbs of Sydney, along with my sister and brother. Sunlight and dappled shadows flash and ripple through the trees, casting extraordinary shapes and colours that dance across my closed eyelids as I struggle to find sleep. The car glides smoothly along the winding New England Highway, gently lulling me into a sleepy state. The sunlight feels like a private, enchanting performance – an orchestra of light playing across my eyelids – perfectly paired with the soothing hum of the engine as Dad drives us home after our holiday visiting our cousins.

As we got closer to home, there were moments when I felt frustrated by the flickering lights that interrupted my quest for rest. I yearned for the comforting embrace of deep sleep, but the bright sun beckoned me to stay awake.

I often think back to my battles with the sun, the moon, and bedtime. Those long summer holiday days were filled with both joy and confusion. My mother insisted that I be in bed before sundown, even as we camped in a caravan park surrounded by new friends who seemed to disregard that rule. I could hear the laughter of children playing outside, and it felt unfair to have a different bedtime. This struggle to stay up later followed me into adolescence, where newfound freedoms became my badge of honour, as I saw my resistance to sleep as a mark of maturity.



In my early twenties, the ability to function on little or no sleep after a night of drinking and partying became a badge of honour. I would return to work or engage in activities while sleep deprived. As I grew older, part of the rite of passage involved pushing the limits of society and my body – whether scuba diving on shipwrecks and reefs or jumping out of aeroplanes.

However, in my fifties, I realise that my body is rebelling against these misguided beliefs about being “cool.” The lack of sleep has more negative effects than positive ones on my mind and body. Now as I rise to greet the sun, my spirits soar alongside it. When the sun sets, I find a moment to set aside my worries, close my eyes, and let my tired body and mind take a break.

Since the Industrial Revolution, much of the Western and developed world has succumbed to the belief that we no longer need nature and that it plays no significant role in our lives. This disconnection has led to long-term environmental harm and a host of chronic health issues for us all.

So, why are so many people drawn to the beauty of a sunrise or the serene charm of an afternoon sunset? Our well-being is intricately linked to the quality of our surroundings, especially our need for sunlight and sufficient sleep.

I can almost hear my teenage self shouting, “BORING!” while rolling my

eyes. “Who cares? We’re here for a good time, not a long time!” But with a playful shake of my finger and a raised eyebrow, I urge you to pay attention.

What makes light, along with its connection to circadian rhythms, vital to the human experience?

Circadian rhythms are molecular processes ingrained in our genetic makeup. They operate in various cells throughout our bodies, including those in the skin, liver, brain, eyes, kidneys, bladder, heart, and stomach, with each organ following its own unique rhythm. Understanding these intricate systems and how light influences our daily routines is key to creating spaces that support our circadian rhythms.

When crafting environments that enhance productivity and creativity, the science behind these factors is truly fascinating. For instance, when considering spaces for mental health, particularly for those with schizophrenia, it’s crucial to recognise that their circadian rhythms differ significantly from those of individuals without the disorder.

The sun plays an essential role in our lives; it fuels our brains with serotonin, fortifies our bones with vitamin D, strengthens our immune systems, lowers the risk of various illnesses, aids in wound healing, boosts energy levels, fights fatigue, eases depression, and helps regulate our circadian rhythms.

We’ve evolved to understand the cycles of seasons and life. As we embraced a diurnal lifestyle, our circadian rhythms became vital for our survival. Within this diurnal state, we find a possible seven variations of circadian rhythms, such as those of early risers and night owls. This diversity has supported human survival, allowing some individuals to rest while others remain vigilant, thereby minimising the risk of predatory attacks. From the moment we are born, our brains begin to interpret the world around us using our senses. It’s not just our eyes that pick up on light, the time of day, and cues for eating or sleeping; our bodies operate on intricate cycles that greatly influence our health. Optimal sleep patterns play a crucial role in maintaining brain health.

The circadian rhythms of our stomach and liver regulate our metabolism and help determine the best times to eat. Meanwhile, the kidney’s rhythms communicate with the bladder’s rhythms, allowing it to expand during the night for a restful sleep. There are specific times throughout the day when our bodies feel more energetic, capable, and productive; the circadian rhythms are the driving force that dictates this for each individual.

Our skin’s circadian rhythm plays an essential role as well, providing the brain with feedback regarding temperature and external conditions. It senses the warmth of the morning and afternoon sun while cooling down in the evening as our core temperature lowers, preparing us for sleep.

Living and working in a temperature-controlled environment can be detrimental to our health in various ways. Our brains, shaped by ancient Palaeolithic lifestyles, are designed to process information at a pace suitable for our ancestors. Previously, time zones changed as quickly as our legs could carry us, but today, with the rapid transport of trains, cars, and planes, our bodies aren’t equipped to keep up.

Regardless of what I thought was important in my twenties, I’ve come to realise that our circadian rhythms are fundamental to how we function in our modern world. The brain gathers data through our senses, allowing us to interpret sensory signals and shape our perceived reality. This includes the light that dances on my eyelids as my dad drives us home. The visual cortex, located at the back of the brain, processes the visual information our eyes receive, enabling us to understand and interpret what we see. This is different for individuals who are visually impaired, and it is the daily routines that support better circadian rhythm function when light cannot be interpreted by the eyes.

Sleep and circadian rhythms are essential ingredients for success. Each stage of the sleep cycle is vital. Recent studies reveal that during REM sleep, spinal fluid rises through the spinal cord, flushing out the toxins accumulated in the brain throughout the day. This groundbreaking finding has been highlighted through advanced technologies and brain scans.



So, what's the significance of light? The quality of sunlight and artificial lighting can greatly affect our well-being. Before delving deeper into this research, I, too, underestimated the powerful influence that light has on us. The implications go far beyond what one might initially think.

Biophilic design not only improves the human experience of the built environment but also promoting the health of humans and biodiversity alike.

Why should I care if I feel worn out and hungover from a lack of sleep? The demands from my job, housework, looming deadlines, and a demanding boss seem to dismiss the importance

of my sleep cycle and whether I feel rejuvenated. The pressures of work, life, and family often overshadow our personal needs.

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But here's the hard truth: our metabolism, kidney and liver function, oxidative stress levels, cardiovascular health, and even mortality rates are all tied to our circadian rhythms. Getting a good night's sleep isn't merely a luxury; it's a necessity. My body doesn't care about the excuses I make or whether I appear "cool." What truly isn't cool is cutting my life short due to poor lifestyle choices.

Poor circadian rhythms and inadequate sleep can lead to a host of serious issues including:

- Fatty liver
- Chronic liver disease
- Chronic kidney disease
- Oxidative stress
- Insulin resistance
- Blood pressure irregularities
- Permanent kidney damage
- Hyperactivity of the sympathetic nervous system
- Inflammation

Circadian rhythms aren't a catch phrase that we can roll our eyes and glaze over with the look of who cares! There is a dynamic reason that circadian rhythms matter.

www.studiochintamani.com

HOW TO LIGHT YOUR HOME FOR WELLBEING

“From energising daylight to cozy evening ambiance, it’s critical to create the optimum light solution for every room for every occasion and purpose.”

Sofie Refer

Sofie Refer, co-founder of Danish lighting brand Nuura, shares expert tips on thoughtful home lighting that aligns with natural light cycles to support well-being. Founded in 2017, Nuura – meaning ‘light and honour’ – creates sensuous designs that transform spaces and enhance daily life. As natural light shifts with the seasons, it’s essential to adapt interior lighting to maintain harmony and comfort throughout changing hours and months.





Kitchen Top Tip: hang lights 70-80cm above kitchen island countertop to provide excellent task lighting a pleasant ambiance without obstructing the view across the room.

THE KITCHEN: The heart of the home is where purpose meets style. A multifunctional space where lighting can make all the difference by introducing thoughtful layers of light to ensure every corner is well-lit. Consider details such as the finishes, the fixtures and bulbs to enhance beauty and create a culinary space for every occasion. Primary lighting in a kitchen, such as ceiling fixtures or flush mounts, provide overall illumination for atmosphere and a great all-around light. Directional task lighting is essential for preparation areas, such as wall lights or hanging pendant lights to support clear and safe precision tasks, while dimmable mood lighting highlights architectural features, decor, and cabinetry, enhancing the atmosphere and making the kitchen inviting yet practical.

THE DINING ROOM: A room for conversations, light transforms a dining room into a welcoming, memorable room for any occasion. Introduce a chandelier or pendant as the 'star of the show', setting the tone and lighting the table. Balance the room with layering light for well-lit warmth and versatility for both dining and conversations. Use decorative lights for warmth and to highlight architectural details, art or furniture, and strategically place wall lights

Dining Room Top Tips: Choose a chandelier or pendant proportional to your table (ie. one-half to two-thirds the width of the table) and evenly space multiple pendant lights apart (typically 60 to 76 centimetres).

to add ambient light and bring coziness and sophistication – dimmable options enable you to adjust mood from festive gatherings to intimate dinners.



THE LIVING ROOM: Use layered lighting in this core room to enhance the ambience, functionality and aesthetic appeal. A mix of primary, task, and decorative lighting ensures that your living room is not only functional but also comfortable and inviting. For primary illumination introduce ceiling fixtures offering soft and evenly distributed light. Add task lighting for focused light when reading or working, either in the form of a floor lamp next to a favourite reading chair or a table lamp for pockets of coziness and focus. For decorative and indirect light introduce wall lamps to add depth, highlight artwork, and set the tone for relaxation or socialising.

THE BATHROOM: A personal sanctuary where our days begin and end. Thoughtful lighting is crucial for balancing the bathroom, be it for a long indulgent bath or practical task-lighting prepping for the busy day ahead. Primary lighting offers the main lighting source, which combined with natural light elevates overall mood and well-being. Select ceiling fixtures such as chandeliers, flush mounts and recessed lighting with opal glass shades, for the most optimal primary lighting. Task lighting at the mirror and sink area plays a vital role for shaving or applying makeup, and the addition of wall-mounted lamps or vertical fixtures with opal glass shades placed either side of the mirror provides a glare-free illumination for the face.

With thoughtful choices, lighting can elevate every room, enhancing both style and well-being throughout your home. Consider layering lighting for different moods and purposes, and always consider the proportions and positioning of light alongside furniture and art. And don't underestimate the magical impact of dimmable lighting. By choosing the right lighting for each space, you can not only transform the look and feel of your home but also improve the atmosphere and functionality of each room, creating the ideal lighting environment, one room at a time.

Sofie Refer, co-founder and designer, Nuura
www.nuura.com



Living Room Top Tips: Light placement is critical. Centre chandeliers or ceiling lights for even illumination and position floor and table lamps where light is needed most. Ensure lamps are the right size in relation to furniture (the bottom of the lampshade should be at eye level when seated).



Bathroom Top Tips: Add mood lighting with dimmable fixtures plus decorative wall lamps to showcase your bathroom's unique elements and to set the vibe according to your mood and needs.



Painting Life back into White Walls

*From Monet to ocean prints,
how nature art can enhance our wellbeing*

Ozge Fettahlioglu

At three o'clock in the morning, hospitals feel like static limbo. It was always so cold, and the fluorescent lights overhead gave the hallways a clinical, unfeeling glow. I spent many nights like that – slipping out of my sister's room so she could sleep, wandering the cancer ward while the rest of the world found its slumber. She was fighting stage 4 osteosarcoma, tethered to experimental treatments that left her immune system fragile. No visitors were allowed in her room unless it was essential. Yet, ironically, I felt more helpless on the other side of that door than I would have by her bedside.

These walls were brutal in their whiteness, reminiscent of an empty canvas that refused to grant any hope. Except for one tiny oasis: a small Monet print tucked away near the waiting area. I don't remember the name of the painting – only that it captured a

haze of colour, water lilies floating on the surface of an unknown pond. That Monet became my lifeline. While my sister teetered between life and death, I craved anything that reminded me the world could still be gentle, that colour still existed somewhere outside of IV drips and sterile gloves.

Little did I know at the time, I was experiencing the powerful effect of **nature-inspired art** – a principle central to **biophilic design**. That single Monet print was enough to ground me, to remind me of something beyond the beeping monitors and the nurse's station. My sister would survive that harrowing year – miraculously. But I often think back to the other three patients in her ward who tragically did not make it. It was as if the Monet offered a quiet place for me to regroup, to soften my panic, even if just momentarily.



Why Nature Art Matters

Years later, I learned there was actual science behind that feeling. Environmental psychologists like **Rachel and Stephen Kaplan** had found that simply **viewing images of nature** can reduce stress, lower blood pressure, and ease mental fatigue. One study showed that prison inmates who watched nature videos felt calmer and committed significantly fewer violent infractions. Another discovered that participants recovered from stressful tasks more quickly when viewing natural scenes versus scrambled images.

Thinking of those nights with Monet's watery blooms, I realised that those watery strokes were more than pretty décor – they were **restorative triggers**. They pulled my mind away from cyclical fear and gave me hope. Nature in art didn't cure my sister, but it did help me cope in that moment when I felt powerless.

From Hospital Halls to Home Sanctuaries

We often assume that to harness the benefits of nature in our daily lives, we need towering indoor plants or scenic windows overlooking a forest. While those are wonderful, the truth is that **nature-inspired artwork** can serve a similar purpose, right at home. Studies

show that hanging pictures of oceans or forests in a living room can encourage calm and creativity, and simply glimpsing them throughout the day provides mini mental breaks.

- **Stress Reduction:** Place a piece of soothing landscape art in view from your sofa or bed – somewhere your eyes naturally wander. A corridor that ends in a piece of nature art can transform an otherwise dull passageway into a micro-retreat.
- **Improved Mood & Psychological Comfort:** Floral prints and patterns, even stylised ones, have been shown to enhance mood and reduce cortisol levels. My own grandmother used to weave rugs with embroidered floral motifs, filling her modest rural house with a sense of life and growth.
- **Enhanced Creativity & Focus:** In home offices, photographs of serene waterscapes or sculptures mimicking organic forms can stimulate both calmness and innovative thinking – perfect for those midday lulls.

Everyday, Innovative Applications

Buying expensive art pieces is hardly the only way to introduce nature's essence into your space. You can easily weave biophilic creativity into your home's décor – here's how.





Digital Screens – If you have a large TV, consider using it as an ambient art display when it's not in use. Play high-definition images or videos of your favourite landscapes – rolling ocean waves, serene forests, or even an aquarium scene. It's like having a window into nature, switching on whenever you need a mental break. **Floral Fabrics** - From bedding and curtains to throw pillows, floral patterns can inject colour and symbolic life. They're also low-commitment: if your preferences or the seasons change, swapping out a cushion cover or duvet is quick and budget-friendly.

Wallpaper & Murals – Large-scale murals of forests, mountains, or whimsical florals can transform entire walls, bringing the outdoors in. They work exceptionally well in corridors, niches, or small bathrooms – turning overlooked areas into vibrant focal points that delight the eye.

Painted Furniture – Instead of replacing that old dresser or side table, paint it with a botanical motif or a soft, nature-inspired colour palette. Incorporating subtle vines or floral designs can rejuvenate tired pieces and add organic charm to your space.

Nature-Infused DIY Art – One of my personal favourites: crafting art from backyard finds. Collect leaves, flowers, or interesting branches and press, dry, or arrange them into frames. You can also experiment with simple printmaking or

stencilling leaves onto paper or canvas. This hands-on approach yields truly one-of-a-kind pieces that reflect your local environment and creativity.

Sculptural Elements – If two-dimensional art isn't your style, consider nature-inspired sculptures or pottery. Pieces that evoke waves, leaves, or organic textures add a tactile, three-dimensional dimension to your home, inviting you to admire and even touch elements reminiscent of the natural world.

Key Reminder: None of these strategies need to break the bank. Whether it's a digital aquarium on your TV, a quilt of pressed flowers from your own backyard, or a fresh coat of botanical paint on an old dresser, the goal is simply to bring a spark of nature's vitality indoors. By doing so, you'll not only refresh your aesthetic, but also subtly support your mood, creativity, and overall sense of well-being.

A Personal Revelation

Standing in that stark hallway all those years ago, it never occurred to me that the Monet might be intentionally placed. But now, as a biophilic designer, I see how small design choices – like **incorporating nature-inspired art** – can carry massive emotional weight. It's not purely about aesthetics or matching paint chips; it's about **cultivating an environment that fosters peace, creativity, and resilience.**



Looking back, I see how that tiny painting was more than just a breath of colour in a colourless place. It was an anchor, a sanctuary made of canvas and ink. It whispered that beauty still existed, a promise that could hold me steady through each frightening hour.

Incorporating Nature to Nurture

Your home doesn't need to resemble an art gallery or an indoor rainforest to be uplifting. Sometimes all it takes is a single piece – a photograph of a misty dawn or a floral tapestry – that quietly asks you to pause and breathe. That's the power of biophilic design: weaving nature's gentle influence into the fabric of our daily routine, reminding us we're part of something larger and kinder than ourselves.

- **Start small:** Hang a painting of a serene forest at the end of your hallway.
- **Use what you love:** If ocean waves calm you, find a framed print or watch a looping sea video.
- **Trust in the science:** It's not just about "feeling nice" – research confirms these images can **reduce stress** and **boost mood**.

In the same way Monet reminded me that hope could transcend the sterility of a hospital at 3am, a single piece of nature-inspired art can be your gentle reminder that there's still wonder – and comfort – to be found, even on the hardest days.

Ozge Fettahlioglu (a.k.a. "Madame Cocoplum") is a Wellness/Biophilic Interior Designer, working in Custom Modular Construction. A **board member of Biophilic Cities Australia and an academic and professional speaker**, Ozge is on a mission to help others harness design as a catalyst for a healthier, more fulfilling life.

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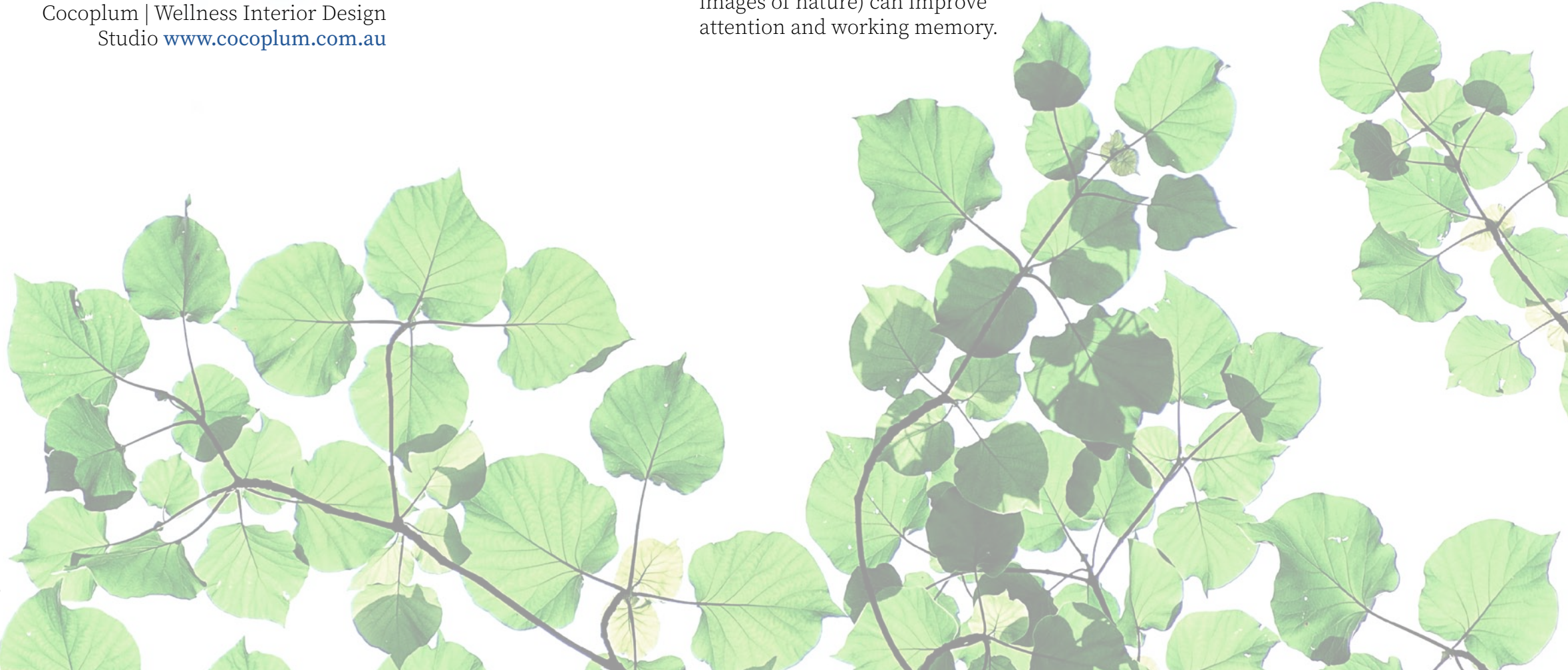
Boxareno | Modular Constructions
www.boxareno.com.au

Cocoplum | Wellness Interior Design Studio www.cocoplum.com.au

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LIGHT IS CONSCIOUSNESS

A reunion of science and spirit

Maureen K Calamia

“For the rest of my life I will reflect on what light is.”

– Albert Einstein

From the sunlit glow of early morning to the way we orient our homes and lives, light is essential. In the design of buildings, it's well understood that natural light is the most critical element for health and well-being. Studies consistently show that access to daylight improves our mood, productivity, sleep cycles, and immune function.

But what if light's importance goes beyond the physical?

Across spiritual traditions and, increasingly, within the language of quantum physics, light is being recognized as something far more mysterious and profound: the very essence of consciousness itself.

Journal of Biophilic Design

WELLBEING

More Than Illumination

Light symbolizes vitality, clarity, and awakening. It nourishes all living things, but it also nourishes the soul. In mythology, religious texts, and mystic traditions, light is consistently equated with insight, divinity, and the awakening of higher states of awareness.

Many ancient depictions of enlightened beings – from Jesus and Buddha to angels and saints – feature halos or radiant light fields surrounding the body. These glowing representations are more than symbolic; they reflect a deeply held belief that light accompanies elevated consciousness.

In Buddhism's *Tibetan Book of the Great Liberation*, practitioners are guided to rest in the “Clear Light” of the mind at the moment of death – pure, radiant awareness that is not separate from our essential nature. In yogic philosophy, light is often used to describe the activation of higher chakras, particularly at the crown of the head where divine illumination is said to enter or exit the body.

These aren't just metaphors. They may be ancient ways of describing a truth we are only now beginning to rediscover through science.

The Science of Light and the Mystery of Consciousness

While mainstream science has traditionally separated physical light from inner awareness, quantum physicists are starting to recognize strange and significant correlations between the two.

Max Planck, considered the father of quantum theory, proposed over a century ago that consciousness is not a product of the brain but rather the source of all material reality. In his own words:

“I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness.”

This idea turns classical science on its head. Rather than assuming that consciousness is something generated by neurons firing in the brain, Planck suggested that consciousness might be a field – ever-present, foundational, and perhaps made of light itself.

Another quantum physicist, David Bohm, took this further with his theory of the Implicate Order, where reality is understood as a constantly unfolding field of information and consciousness:

“Consciousness is an enfolded order. Light carries the information that unfolds reality, including the conscious observer.”

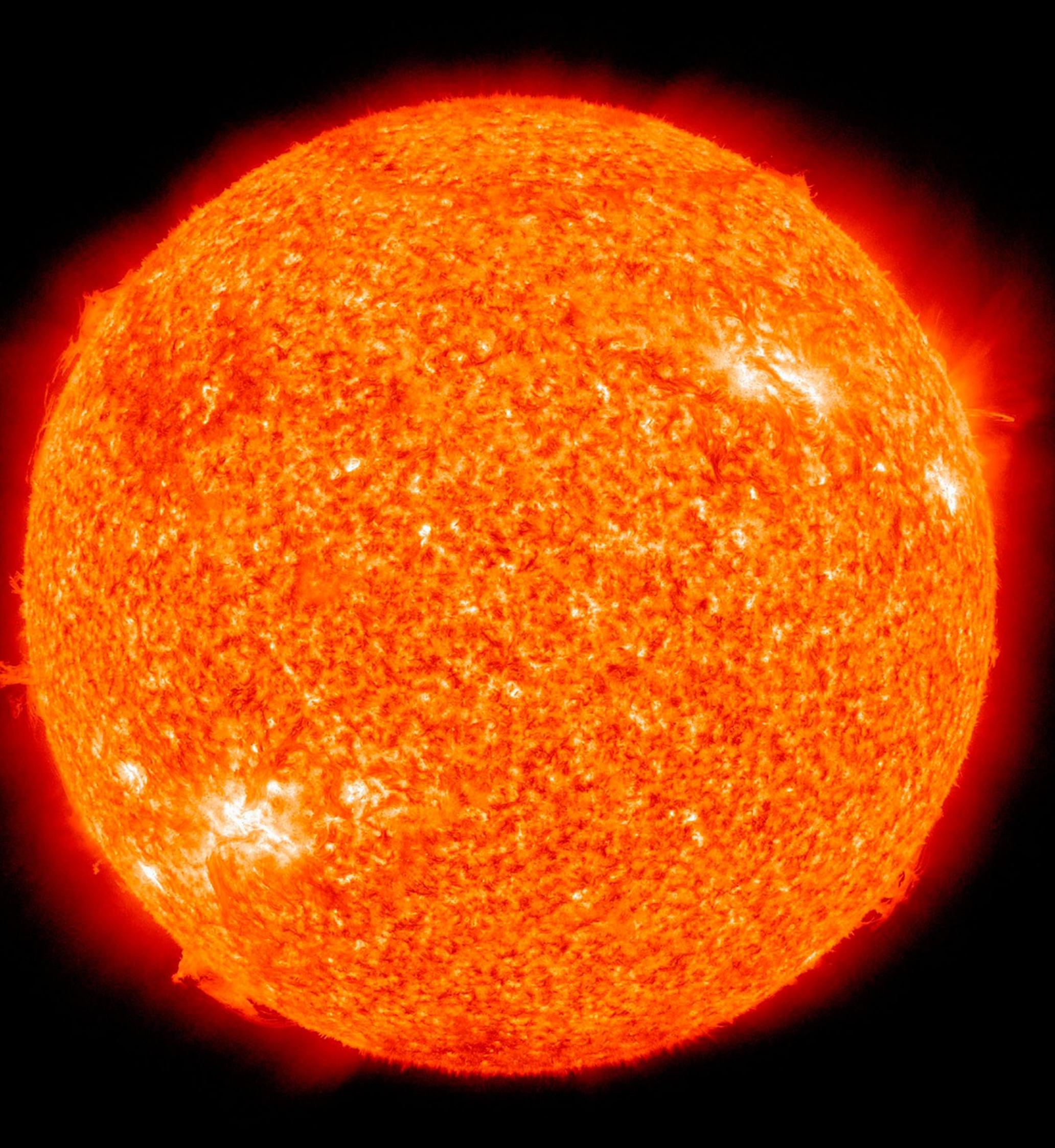
Bohm described a universe in which everything – matter, thought, awareness – is part of a greater wholeness, a luminous field in which light doesn't just travel through space but organizes space itself.

Beings of Light

On the cellular level, humans emit low levels of bioluminescence. This is not just poetic – it's measurable. Biophoton emissions, faint light emitted by living cells, are being studied as indicators of health and possibly even consciousness.

Some researchers propose that the body communicates through light, in addition to chemical and electrical signals. Our DNA emits photons, and cells appear to use this light for intracellular communication. The coherence and organization of this light may reflect our mental, emotional, and spiritual states.

This biological phenomenon lends new weight to the idea that we are quite literally *light beings* – not just metaphorically, but energetically and physically.



Light, Solar Cycles, and Consciousness Shifts

We are currently in a solar maximum, part of an 11-year cycle where the sun's activity peaks in the form of sunspots, solar flares, and coronal mass ejections. These powerful bursts of solar radiation don't just influence our weather systems and magnetic fields – they may also be affecting human consciousness.

Some researchers and spiritual thinkers believe these solar cycles correspond with heightened states of awareness, global shifts in consciousness, and even increased psychic or intuitive phenomena.

Although this remains a controversial topic in mainstream science, correlations between geomagnetic storms and human behavior, sleep disturbances, and emotional fluctuations are well documented. Whether subtle or profound, we are undeniably connected to the greater cosmic forces that light our world.

The Great Convergence: Science and Spirituality Reunite

We are living in extraordinary times. The long-divided realms of science and spirit are now circling back toward each other. What spiritual mystics, indigenous elders, and ancient texts have always known – that light is a living force of

consciousness – is finding a new voice in quantum theory, neurobiology, and biophysics.

Light is no longer just what we see – it is what we *are*.

This convergence is more than theoretical. It invites a transformation in how we perceive ourselves, our relationships, and the universe itself. As we awaken to this radiant truth, we may begin to understand our own consciousness as luminous, interconnected, and far more powerful than previously imagined.

Living in the Light

In practical terms, this perspective reminds us to seek light – in our environments, our practices, and our minds. Let in more natural light. Spend time in the sun, among the trees, and under the stars. Practice meditation, where the inner “light of awareness” becomes increasingly clear.

And above all, stay curious.

Einstein, perhaps the greatest scientific mind of the modern era, spent his life contemplating the mystery of light. He sensed there was more to it than physics alone could describe. Today, we are discovering just how right he was.

<https://www.luminous-spaces.com>

Field – Image by [Andalusian](#) from [Pixabay](#)

Solar flares – Image by [WikiImages](#) from [Pixabay](#)

BIOPHILIC CITIES



REIMAGINING LONDON'S GREY BELT?

“A “grey belt” is low-value farmland, golf courses, and derelict land that does little for nature. This also sits within the “Green Belt” area. Planning law and ecology sometimes do not seem to be best of friends, we asked a planning specialist to tell us more about the “grey belt” and what this means to planners, and also if this has to happen can we weave biophilic design into these spaces to enhance the outcomes.”

Harry Dodd

The ‘new’ NPPF (National Planning Policy Framework, published in December 2024) formally introduced and defined the “grey belt” to planning parlance with a view to boosting housing growth in England. It is argued that carefully planned development on these poor-quality green belt areas, guided by robust Biodiversity Net Gain (BNG) principles, can transform them (and other sites through ‘off setting’) into ecological assets. BNG mandates a minimum 10% increase in biodiversity post-development, measured using standardised metrics. This isn’t just about offsetting losses; it’s about actively enhancing the environment.

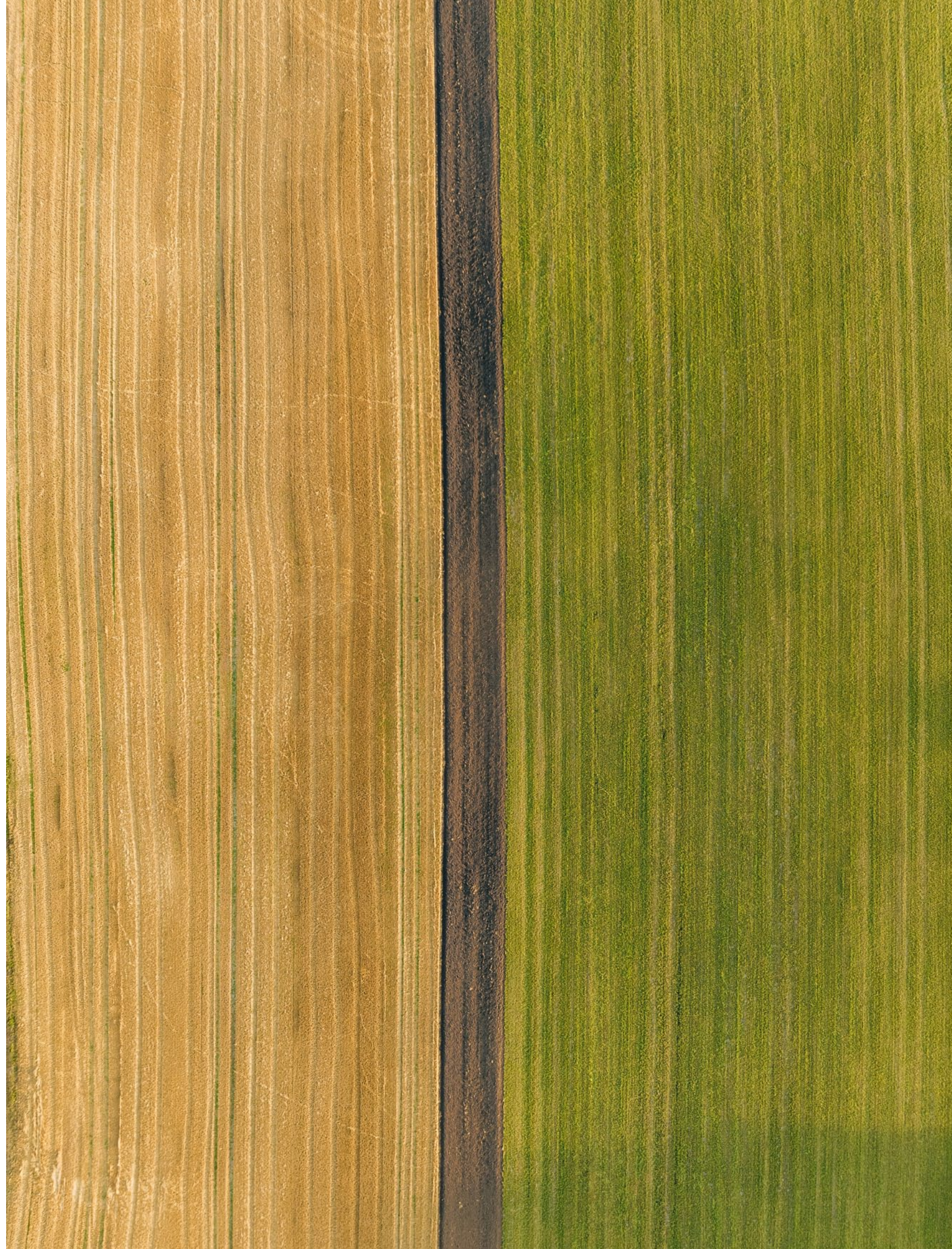
This “grey belt,” sits within London’s green belt, and while technically green, contributes little to biodiversity, think intensively farmed fields, golf courses, or even derelict sites. Imagine replacing a sterile field with diverse native woodlands, wildflower meadows, and wetlands. Such interventions not only

support local wildlife but also create valuable green spaces for people.

And this is where biophilic design comes in. By integrating nature into the built environment – maximising natural light, incorporating green walls, and creating accessible green spaces – we **can** design developments that benefit both ecological health and human well-being, whilst boosting housing numbers and economic growth at the same time.

Of course, concerns about green belt development are valid. However, by focusing on “grey belt” sites, prioritising BNG, and embracing biophilic design, we can address these concerns. Development, in this context, becomes a catalyst for ecological renewal, bringing nature closer to urban populations and creating a more sustainable, resilient London.

Harry Dodd is Director at NUKO Planning
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Swift Street

“Swifts have seen a sharp decline in numbers and are now on the UK’s Red List of birds. We celebrate a success story which combines community, tenacity and vision which has led to the creation of two new ‘Swift Streets’, part of the RSPB’s wider, continued effort to transform Manchester into a ‘Swift City’.”

Suzanne Pendleton

Swifts have suffered a massive decline, losing over 60% of its population since 1995, due in part to loss of nesting sites and food availability. It was recently added to the UK’s Red List of birds, meaning its amongst our most endangered. But as the result of the energy and enthusiasm of resident Suzanne, things are changing for the Swifts in Manchester.

Suzanne Pendleton developed a love for Swifts totally by chance while recovering at home from a badly broken leg. Suzanne became aware of the sight and sounds of birds overhead, which she later discovered from a neighbour were Swifts. Delving deeper, she learned the species is under serious threat – in part, due to a lack of nesting sites – and decided to take action, using flyers and her street’s WhatsApp group to rally everyone.

More than 40 households came together to put up a total of 81 hand-made Swift nest boxes in their street. The boxes were made by learners from a local independent skills provider, as part of their apprenticeships. **Local Brownies** (whose group is led by Suzanne) **and**

Scouts have painted and water-proofed the boxes, ready to be erected by a local roofer. A home-coming **community event in May** was held to welcome back the Swifts – with a **special VIP guest appearance** from RSPB ambassador and BBC *Springwatch* presenter, author and zoologist **Megan McCubbin**.

We asked Suzanne about what has made this such a success.

“I’m so, so excited. Over in Swinton, Salford in Greater Manchester last summer we started a project with the RSPB – funded by players of People’s Postcode Lottery – to develop our own Swift Street. We popped flyers through doors and made use of a community messaging group and were bowled over by the response, with more than 80 Swift boxes requested. With Roshni (Parmar-Hill, Community Engagement Officer) from the RSPB’s advice, we visited all the homes and helped residents choose a suitable spot to place boxes. Ideally boxes shouldn’t be south facing and have a minimum five metre drop to enable Swifts to swoop in.





“Sadly, Swifts have seen a sharp decline in numbers and are now on the UK’s Red List of birds (meaning it’s amongst our most endangered). This is related to a reduction in their nesting sites, which are typically in roof eaves as they are mostly an urban bird. With insect populations in decline there is also less food for the Swifts too.

“Using Swift Mapper (an app for recording Swift nesting sites) and local knowledge, we knew there were already a small number of nest sites in four local houses. We have a colony of about 25 Swifts and hope to support them locally to offer the boxes as sites for returning birds. Seeing the birds’ aerial manoeuvres around the houses each evening in their screaming parties is just the best. We think they are such dynamic, incredible little birds and so many of the residents want to do all they can to support them.

“The development of our Swift Street has been a whole community event. Learners at a local skills provider made the boxes, whilst Brownies, Guides and Rangers painted them, a local lady fitted nest cups inside and it all came together at the beginning of the year when the first round of boxes went up courtesy of a local roofer Ryan.”

What’s so great about Swifts?

One of the last migratory birds to arrive in the UK each spring – for many people, it’s the bringer of summer. Swifts travel more than 3000 miles from East Africa, crossing an epic 25 different countries in around four weeks to reach us. They are

the fastest bird in level flight – reaching speeds of almost 70mph. A Swift can travel the equivalent of eight trips to the moon and back in their lifetime! They spend the majority of their life in the air – feeding, sleeping and even mating on the wing – only landing to nest.

Megan McCubbin, RSPB ambassador and BBC Springwatch presenter, author and zoologist said “*Swifts are hands-down one of our most incredible birds but they are facing some enormous challenges. Fewer insects and loss of nesting sites is really impacting their ability to raise young, which is essential for the survival of any species.*

I can’t tell you how inspired it makes me feel when I hear stories of Swift supporters up and down the country coming together to take action to help this iconic bird. The efforts of this community in Swinton are extraordinary and I’m thrilled to be involved in launching our newest ‘Swift street!’

So, here’s to a spring and summer with an aching neck as we look to the skies before the birds leave Swinton and head back on their epic journey to Africa for another winter,” said Suzanne.

To find out more about the project and also the RSPB visit [rspb.org.uk](https://www.rspb.org.uk)

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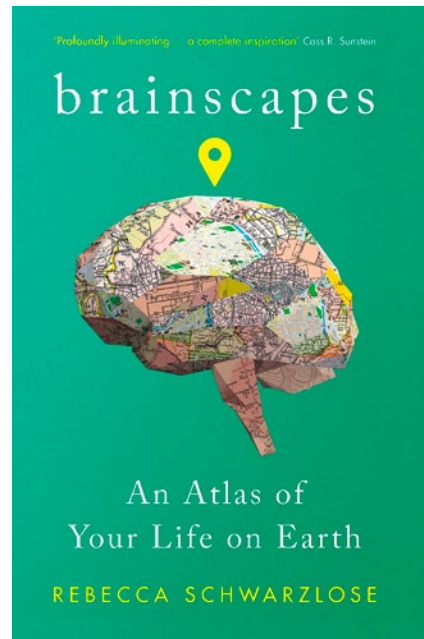
Swift boxes installation images
(credit Roshni Parmar-Hill)

Swifts in nest box
(credit Louise Bentley from Bolton and Bury Swifts)

BOOKSHELF

Books sitting on my bookshelf and finding themselves in my hands this month

Reviewed by our editor,
Dr Vanessa Champion



Brainscapes – An Atlas of your Life on Earth by Rebecca Schwarzloseby.

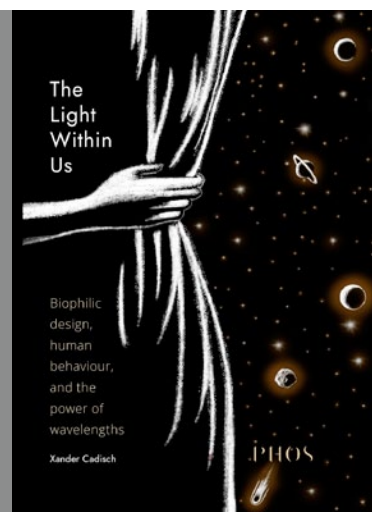
This is the most brilliantly written book. It's like sitting on the sofa with a mate chatting about how the brain works. She guides us through brain maps showing how our brains react to smell, taste touch, memory and so much more.

Pages 219-221 of the paperback edition published by Profile Books in 2022 (if you are looking at the same copy) are 3 pages of very cool info on how our brains decipher light. Figure 33 shows how our brains interpret left and right eye, then vertical and horizontal alignment, and also blobs of colour. It's in the chapter on “Maps as Portals: Mind Reading and Mind Writing with Brain Maps”.

Also, Chapter 3 is focussed on “How Brain Maps determine what we see and feel”. She describes how our eyes make 5 quick movements per second more or less every waking moment of our lives, the information is “so beautifully stitched together that we are typically not even aware of them, although we can consciously detect them when we pay attention.” She asks us, and you can do the same here. “If you try and read this sentence without moving your eyes, you will see the impact of this specialization in action”.

All of this, and all the wonderful information which is so easily digested (ideal beach reading if you are thinking of taking something with you to dip into on holiday) helps add more evidence on how important our environment is to us.

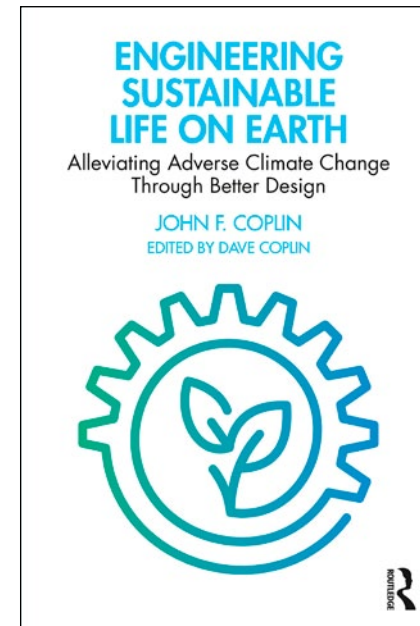
Biophilic Design supports these healthy spaces that we move through every day, whether that's at home in bed or walking through our towns and cities. This book gives us yet more evidence which proves that we should be mindful of how we specify our environments, because everything around us, everything we touch, see, smell, hear, taste impacts our brains. Let's try and aim to make our brains happy.



The Light within us – Biophilic Design, human behaviour and the power of wavelengths, by Xander Cadish.

We couldn't have an issue on Light without reviewing Xander's super handbook on Light and how it impacts our brains, health, wellbeing and so much more. The book has a great format with images, fold out pages, infographics and examples illustrating how light “works”.

Xander spoke at our first Biophilic Design Conference held at the Barbican in London in November 2024, and just like the book, he has a gift of explaining complex ideas on light so simply, with humour and in a style which is incredibly easy to digest. The book has lots of references and homages to Biophilic Design throughout, with bite sized learnings and case studies to help you grasp the concepts.



Engineering Sustainable Life on Earth – Alleviating Adverse Climate Change through Better Design by John E. Coplin (edited by Dave Coplin).

Written by an aeronautical engineer and chief designer of Rolls-Royce's RB211 aeroengine. As you would imagine this book is jam packed with brilliant thinking on how we can take great strides in

tackling climate change. The ideas presented are not just ideas, these are evidenced-based solutions based also on calculations and science learnt from nature.

Threaded through the whole book is a sensitive respect and understanding of our innate connection and dependence on nature, while skilfully challenging current thinking on local transport, clean and renewable energy, food and agriculture as well as housing and communities.

There is so much to learn from every chapter and you will see how the principles of biophilic design can help support some of the solutions and accelerate the change in our built environment. But I want to focus on a few things he recommends in Part 5, Homes and Housing. The critical action (which are listed as

bullet points on each chapter title page) for housing is “Accelerate the move towards better, affordable, carbon-neutral housing.” I'm not sure about you, but when I read, my brain tends to have a conversation with the pages as I go. I found myself at this point thinking, ooh timber building, 3D printing biobased materials, local materials, social communities ... As I turned the page, it was like having the best exchange with a marvellous mind. In fact, he opens this chapter with a call for Biophilic Design, bringing in as an example Singapore. I love this description “A biophilic building attempts to replace walls, windows, and columns with leaves, bark, birds and insects.” The reason I love this so much is because the description brings in the result of biophilic design, it cuts to the chase. When we design with biophilic design we bring in LIFE. We bring in direct and living connection to our natural world. He mentions as an example WOHA (woha.net) which is an architecture practice in Singapore which connects nature to the “manufactured world” (as John puts it perfectly).

He also mentions in densely industrialised nature there is scope for vertical farming to match demand for fresh food. He says even smart cities release greenhouse gases and while some can be collected “the remainder needs to be absorbed by trees that deliver the oxygen cities need for healthy lives.” Gosh there is so much in this book, let alone all the other chapters on clean energy, transport including as you would imagine, solutions for commercial aviation, urbanisation and dispersed communities and ending on unheeded warnings and critical actions. As the title suggests, we really can engineer sustainable life on earth, and biophilic design helps quicken the transformation.

My favourite part of the book is Section 2 “How light shaped us – eyes as windows to the world”. In this chapter he looks at the evolution of sight from the Big Bang to how every “fibre of our being, from red blood cells to our DNA is influenced by light. It is the great constant of our planet's existence.” He also explores fractals, wavelengths, the visible spectrum, physiological responses to light and colour, fractals, chronotypes and more.

Light pollution, the modern light source the LED, impacts of poor lighting, exposure to blue light for night-shift workers are all explored as well as how

to create natural light artificially looking at tunable lighting, intensity of light, distribution, spectrum and reducing or removing flicker.

If you are looking for a guide to help you understand and design with light, then this will give you a brilliant head start wherever you are in your design career. Also, if you are a teacher, nurse, doctor, office manager or anyone in between, there are so many tips and ideas all backed up by evidence and science that you'll be creating spaces that are healthier for people and for the wildlife we impact with light daily too. Get your hands on a copy!

FINAL WORD

Dr Vanessa Champion
Editor

Both Biophilic Design and Light are essential because they reconnect people with nature, promoting health, wellbeing, and productivity. Natural light regulates our circadian rhythms, improving sleep, mood, and focus, while reducing stress and illness.

Biophilic principles – like views of nature, organic forms, and natural materials – enhance emotional connection to place and support cognitive restoration. In urban environments where access to nature is limited, integrating daylight and biophilic elements into architecture fosters more humane, vibrant, and resilient spaces.

Together, light and biophilic design create environments that are not only more beautiful, but deeply supportive of human flourishing and ecological balance.

Circadian rhythm, light temperature, innovation, biomimicry, collaboration, and scientific research all play a vital role in designing healthier, more sustainable environments for both people and planet. Light deeply influences our physical and mental wellbeing. Poor lighting can disrupt sleep patterns, reduce productivity, and increase stress levels, while well-designed lighting aligned with natural cycles can support our health, creativity, and overall happiness.

For those working in, or exploring Biophilic Design, understanding how light affects the human body and mind is essential. It's not just about aesthetics or

function – light shapes how we feel, work, and interact with our surroundings.

Artificial light that's poorly planned can harm ecosystems, disrupting wildlife and the natural world.

This is why thoughtful, research-led approaches – drawing on fields like biomimicry and circadian science – are so important.

Through collaboration and shared knowledge, we can ensure lighting design supports life in all its forms.

Learning from experts featured in this issue of the Journal of Biophilic Design helps deepen our understanding and empowers us to create spaces that are not only visually uplifting but also life-enhancing. In doing so, we contribute to a future where buildings and cities help both people and nature thrive.

Join us for the next issue, where we'll explore the power of sound – diving into acoustics, soundscaping, psychology, materials, design, architecture, urban landscapes, and more.

Together, we're shaping healthier, more harmonious spaces for people and planet. Thank you for being a vital part of this journey.

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