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The Beauty of Fireflies: Transience, Myth, Bioluminescence, and Wonder

Kate Flint

The beauty of fireflies captivated the imagination of Victorian poets, naturalists, short-story writers, and travel writers alike. Like their earthbound relatives, glow-worms, these unremarkable brown insects in daytime became otherworldly sparks of light by night. This article explores their evocative potential — not least for John Ruskin — to capture the magic of an Italian summer's evening. It shows how their metaphorical potential was readily exploited: fireflies were seen across cultures as synonymous with the soul; glow-worms as humble creatures whose special qualities would nonetheless shine out. Both fireflies and glow-worms were imaginatively linked to the fairy world, as we see in paintings as well as in writing. I move from these imaginative representations to consider how bioluminescence was understood by Victorians, and how the language of their investigations borrowed from a register of fantasy. Even when the phenomenon of firefly illumination was better understood, the sense of wonder that these creatures can create persisted. Yet today, the numbers of these insects are currently diminishing, due to habitat loss and light pollution. Although their magical beauty can be alluded to, and recreated artificially — as in Yayoi Kusama's Infinity Rooms, experiencing these light shows functions as an analogy, not a substitution. Fireflies and glow-worms are a reminder of wonder's powerful motivating force when it comes to taking action against environmental precarity: to experience them is to be affected emotionally by them, and they represent the extraordinary beauty, yet fragility, that we encounter in the natural world. They contain a paradox that was well recognized in the nineteenth century: that the small, dull-coloured, and apparently insignificant can contain the sublime.

'How things bind and blend themselves together!' writes John Ruskin, opening the final paragraph of his autobiographical *Praeterita* (1885–89).[1] This phrase simultaneously summarizes his habitual associative powers; the workings of his memory, and his holistic understanding of the world. He continues in a nostalgic tone, recalling his time in Siena in 1870. Together with Charles Norton, he drank from the waters of the Fonte Branda,

> and walked together that evening on the hills above, where the fireflies among the scented thickets shone fitfully in the still undarkened air. *How* they shone! moving like fine-broken starlight through the purple leaves. How they shone! through the sunset that faded into thunderous night as I entered Siena three days before, the white edges of the mountainous clouds still lighted from the west, and the openly golden sky calm behind the Gate of Siena's heart, with its still golden words, 'Cor magis tibi Sena pandit,' and the fireflies everywhere in sky and cloud rising and falling, mixed with the lightning, and more intense than the stars. (XXXV, 562, emphasis in original)

The long Tuscan twilight, and the motion of the fireflies, are accentuated by the extended undulations of Ruskin's prose.

Siena was far from being the only Italian location to be linked in such lyrical fashion to these bioluminescent insects, even if Ruskin provides the best-known description of their beauty and transience.[2] Horticulturalist and garden writer Maria Theresa Villiers Earle wrote of them at Fiesole in the dusk — 'wonderful fairy-like things that flit about in millions under the Olive trees and in the corn'.[3] American novelist Virginia Wales Johnson, in her very overblown book about Florence, records them dancing 'in mazy lines of light through the dusky paths of the Cascine', rhapsodizing about the magical properties of 'Nature's elfin and mysterious illumination [...]. The noiseless flight of the fireflies weaving in and out of the obscurity of the foliage is like a dream entangled in other dreams, without beginning or end.'[4] Ouida (Maria Louise de la Ramé) in *Signa* — set, again, in Tuscany — 'wonders [that] there are no fairies where there are fireflies, for fireflies seem fairies'.[5]

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[1] 'Praeterita', in *The Works of John Ruskin*, ed. by E. T. Cook and Alexander Wedderburn, Library Edition, 39 vols (London: Allen; New York: Longmans, Green, 1903–12), XXXV: *Praeterita and Dilecta* (1908), pp. 13–562 (p. 561).

[2] For more on Ruskin and fireflies, see William Arrowsmith, 'Ruskin's Fireflies', in *The Ruskin Polygon: Essays on the Imagination of John Ruskin*, ed. by John Dixon Hunt and Faith M. Holland (Manchester: Manchester University Press, 1982), pp. 198–235.

[3] Mrs C. W. [Maria Theresa Villiers] Earle, *More Pot-Pourri from a Surrey Garden* (London: Smith, Elder, 1899), p. 338.

[4] Virginia W. Johnson, *The Lily of the Arno; or, Florence, Past and Present* (Boston: Estes and Lauriat, 1891), pp. 98–99.

[5] Ouida [Maria Louise de la Ramé], *Signa: A Story*, 3 vols (London: Chapman & Hall, 1875), I, 148.

In what follows I explore further the evocative properties of fireflies and their earthbound relatives, glow-worms. They are so captivating — unremarkable brown insects by day; otherworldly sparks of light by night — that their metaphorical potential was exploited by short-story writers and poets alike. They partake in a wide-reaching Victorian fascination with insects, whether with their natural history, or as political or moral exempla, or as inspiration for jewellery and decoration.[6] And yes, live fireflies could even be worn themselves. Noting the exceptional brilliance of Jamaican fireflies — something remarked upon by countless travellers — one commentator claims that the light they emit 'resembles exactly the lustre of the diamond', and that 'the Creole coquettes' frequently will 'insert a few of them, confined in pieces of thin gauze, among their hair, and in various parts of their dress, just as our belles at home avail themselves of the ingenuity of the paste-jeweller'.[7]

But reaching beyond these approaches, compelling as they are, I develop the tension articulated by Earle when she writes of fireflies: 'The poetry that hangs around them is endless; their natural history is prosaic' (p. 338). In the case of fireflies and glow-worms, these two categories are, however, rarely far apart. Poetry — in the broadest sense — joins with science in nineteenth-century considerations of these insects. The language of naturalists and scientists readily borrowed from registers of fancy. Fireflies, in other words, are disruptive: they work across conventional categories. They introduce an element of rarity, surprise — even magic — into prose and poetry, but their scientific investigation likewise calls on registers of the supernatural as naturalists looked to explore the other-worldly phenomenon of bioluminescence. Furthermore, the mercurial nature of their flickering appearance — at dusk; in early summer — means that they are an ephemeral presence not just on any given evening, but on a longer, calendrical scale. It is small wonder, then, that their literary presence mirrors a similar pattern: they appear, and then they are gone. Used to evoke a tranquil, warm, elongated evening; or arriving as a quick, glittering metaphor, they are rarely a sustained presence on the page. To see their importance en masse, as a recurrent trope, means tracing their presence across numerous texts. When one assembles this artificial company of fireflies and glow-worms, something further emerges: that not only do they provide an ideal starting point for discussing the conjunction of beauty and affect, but one can see how their association with particular places and environmental conditions

[6] See J. F. M. Clark, *Bugs and the Victorians* (New Haven: Yale University Press, 2009).

[7] Francis C. Woodworth, *Wonders of the Insect World, with Illustrative Engravings* (New York: Woodworth, 1853), p. 77. This anecdote was reproduced in periodicals — on both sides of the Atlantic — from at least 1841 onwards, often slightly reworded. It made a glittering filler in many columns containing miscellaneous trivia. I have not been able to track down its origin definitively.

connects these small Victorian insects with today's urgent ecological concerns. They provide a compelling example of how attention to the small and evanescent is inescapably entwined with changes to the environment that are taking place on a huge scale — and also bring home the point that wonder at beauty still has a part to play in our engagement with the natural world.

The appeal of these dancing creatures of light was, of course, by no means confined to central Italy — even if observing their crepuscular ballet was so frequent in the writings of late nineteenth-century Anglo visitors to Tuscany and Umbria that to invoke them became almost a cliché of descriptions of magical warm dusk. Over two thousand species of beetles belonging to the family *Lampyridae* are known to exist — on every continent except Antarctica. These include not just the many diverse flying species that get grouped together under the heading 'fireflies', but also glow-worms, a flightless member of this family that is found in Britain (which has no airborne *Lampyridae*), and in many other places worldwide. Fireflies flicker through the pages of travellers, naturalists, and poets, invaluable when it comes to creating the impression of strangeness and beauty, even if those who invoke them have never witnessed their luminescent dance at first hand. So when Robert Southey, who never crossed the Atlantic, wanted to create the magical power of a tropical night in *Madoc* (1805), he envisages it as full of tiny moving dots of fire:

> Sorrowing we beheld
> The night come on; but soon did night display
> More wonders than it veiled; innumerous tribes
> From the wood-cover swarmed, and darkness made
> Their beauties visible; one while they streamed
> A bright blue radiance upon flowers which closed
> Their gorgeous colours from the eye of day;
> Now motionless and dark eluded search,
> Self-shrouded; and anon, starring the sky
> Rose like a shower of fire.[8]

In North America Henry David Thoreau writes memorably of fireflies in his journals. While observing them with the inquisitive eye of the naturalist — why do they display light? Why do they congregate how they do? — and recording, correctly, that the light show is part of a courtship ritual, their floating beauty makes it impossible for him to resist fanciful analogy. On 14 June 1851 he noted:

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[8] *The Poetical Works of Robert Southey*, 10 vols (London: Longman, Hurst, Rees, Orme, and Brown, 1837–38), V: *Madoc*, 49–50.

> Where there was only one firefly in a dozen rods, I hastily ran to one which had crawled up to the top of a grasshead and exhibited its light, and instantly another sailed in to it, showing its light also; but my presence made them extinguish their lights. The latter retreated, and the former crawled slowly down the stem. It appeared to me that the first was a female who thus revealed her place to the male, who was also making known his neighborhood as he hovered about, both showing their lights that they might come together. It was like a mistress who had climbed to the turrets of her castle and exhibited there a blazing taper for a signal, while her lover had displayed his light on the plain.[9]

A year later — mid-June seems to have been the prime time for fireflies in Walden in the 1850s — he compares their twinkling to that of the stars: 'Have not the fireflies in the meadow relation to the stars above, *étincelant* [twinkling]? When the darkness comes, we see stars beneath also. [...] Do not the stars, too, show their light for love, like the fireflies?'.[10] Here, Thoreau takes the illumination of fireflies beyond a sexual courtship display — one that can be paralleled with earthly idealized romanticism — to a more metaphysical level: fireflies, like stars, connect us to a transcendental plane.[11] In Tennyson's 'Locksley Hall' (1835; pub. 1842), the two swirl together, indistinguishably: 'Many a night I saw the Pleiads, rising through the mellow shade, | Glitter like a swarm of fire-flies tangled in a silver braid.'[12]

In the early twentieth century, such idealization was to be debunked by Robert Frost, as ever tempering his own transcendental impulses with a hefty dose of realism, when he wrote:

> Here come real stars to fill the upper skies,
> And here on earth come emulating flies,
> That, though they never equal stars in size,
> (And they were never really stars at heart)
> Achieve at times a very starlike start.
> Only, of course, they can't sustain the part.[13]

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[9] *The Writings of Henry David Thoreau: Journal*, ed. by Bradford Torrey, Walden edition, 14 vols (Boston: Houghton Mifflin, 1906), II: *1850–September 15, 1851*, 260.

[10] *Writings of Thoreau*, ed. by Torrey, IV: *May 1, 1852–February 27, 1853*, 108–09 (16 June 1852), emphasis in original.

[11] On Thoreau and religion in relation to social justice and climate change, see Alda Balthrop-Lewis, *Thoreau's Religion: Walden Woods, Social Justice, and the Politics of Asceticism* (Cambridge: Cambridge University Press, 2021).

[12] 'Locksley Hall', in *Tennyson: A Selected Edition*, ed. by Christopher Ricks, rev. edn (London: Routledge, 2007), pp. 181–93 (p. 183).

[13] 'Fireflies in the Garden' (1928), in *The Poetry of Robert Frost: The Collected Poems*, ed. by Edward Connery Lathem (New York: Holt, 2002), p. 246.

But the association of fireflies with an ineffable sense of natural beauty lasted throughout the nineteenth century, the bioluminescent insects joining earth and heavens, like delicate natural fireworks ascending — as the narrator of Vernon Lee's 'A Wicked Voice' describes a high, vibrating, sweet note magically piercing the night air 'as the darkness is cloven by a falling star or a firefly rising slowly like a rocket'; or when Lee writes, in 'Old Italian Gardens', of

> the great May nights, when my own small scrap of garden, not beyond kitchen sounds and servants' lamps, is made wonderful and magical by the scents which rise up, by the song of the nightingales, the dances of the fireflies, copying in the darkness below the figures which are footed by the nimble stars overhead.[14]

Ruskin, in another passage where he recollects the magic of firefly-studded Italian summer evenings, also uses this simile, describing a Dominican convent 'at evening, the peaks of the Carrara mountains, purple against the twilight, dark and calm, while the fire-flies glance beneath, silent and intermittent, like stars upon the rippling of mute, soft sea'.[15] Like fireflies themselves, these invocations echo one another, engage in a dance of similarity and difference. What all of them share is the use of fireflies to create affect. Even Thoreau's careful observation of firefly movement gives way to the language of medieval romance. These are descriptions that look to immerse the reader in the natural world to feel its beauty, while at the same time calling on the language of dancing stars to suggest the elusiveness of such a magical scene.

The firefly's contradictions render it especially amenable for metaphorical translation. It is dull by day; other-wordly by night; its unprepossessing exterior conceals the presence of great beauty. The analogy of firefly with hidden riches concealed in a mundane exterior made it an obvious symbol for the soul itself. Take two, linked poems: Eugene Lee-Hamilton, Vernon Lee's half-brother, confined by paralysis to a wheeled bed for twenty years, meditates on the Florentine hillside outside his villa:

> Now one by one the live winged sparks of night,
> Like souls allowed to wander as they please
> Through old loved haunts, go by between the trees
> In silent zigzags of alternate light;

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[14] Vernon Lee, 'A Wicked Voice', in *Hauntings: Fantastic Stories* (London: John Lane, The Bodley Head, 1906), pp. 195–237 (p. 231); and Vernon Lee, 'Old Italian Gardens', in *Limbo and Other Essays* (London: Richards, 1897), pp. 107–32 (p. 131).

[15] 'The History of Christian Art' (1847), in *Works*, ed. by Cook and Wedderburn, XII: *Lectures on Architecture and Painting, etc.* (1904), pp. 169–248 (pp. 233–34).

And grow in number, bodiless and bright,
    So that the eye, too slow to count them, sees
    Nothing but fire all round; till by degrees
Quenched in the dawn, they vanish from the sight.[16]

But if fireflies and souls can be aligned, the sonnet asks, what happens with the coming of dawn? Lee-Hamilton's metaphors become, perhaps deliberately, hard to disentangle at this point, when he asks:

And those more subtle sparks, which they recall,
    The countless souls with which regret and love
Once peopled Death's great night, are they quenched too? (p. 80)

It is uncertain if the 'more subtle sparks' are the faraway stars, or the souls of those who are long dead — in either case, the invisibility of firefly and starlight once dawn comes might signal, the poem suggests, that both evidence of the afterlife and the presence of magic have been extinguished by rationality:

Has Thought's strong dawn, which searches into all,
    Reached even them, unpeopling Heaven above,
To leave us nothing but the empty blue? (p. 80)

Lee-Hamilton made a miraculous recovery from his paralysis; he married the novelist Annie Holdsworth, and they had a daughter, Mimma Bella, who died, aged two, from meningitis. Fireflies make another and somewhat more hopeful appearance in one of the heartbreaking sonnets he wrote in remembrance of this little girl:

Lo, through the open window of the room
That was her nursery, a small bright spark
Comes wandering in, as falls the summer dark,
And with a measured flight explores the gloom,

As if it sought, among the things that loom
Vague in the dusk, for some familiar mark,
And like a light on some wee unseen bark.
It tacks in search of who knows what or whom?

[16] Eugene Lee-Hamilton, 'Fireflies', in *Sonnets of the Wingless Hours* (Chicago: Stone & Kimball, 1894), p. 80.

I know 'tis but a fire-fly; yet its flight,
So straight, so measured, round the empty bed,
Might be a little soul's that night sets free;

And as it nears, I feel my heart grow tight
With something like a superstitious dread,
And watch it breathless, lest it should be she.[17]

Rationality is no match, in this case, for imagination and desire for the impossible. Yet the idea of fireflies as enshrining the spirits of the dead is an enduring one and reaches across cultures. It provides the closest to a consolatory ending that could be possible for Studio Ghibli's devastatingly sad anime war film, *Grave of the Fireflies* (1988).

So malleable is the soul/*Lampyridae* comparison, indeed, that it can emerge in one form, and then mutate to suit another environment. In Rider Haggard's 1885 adventure novel, *King Solomon's Mines*, the African chief and warrior, Umbopa, consults with Sir Henry on the enormous issue of the nature of existence. 'What is life?', he muses. 'It is the glow-worm that shines in the night-time and is black in the morning; it is as the white breath of the oxen in winter; it is the little shadow that runs across the grass.'[18] In a strange act of cultural transmission — or the invention of tradition — the words of this fictional African have been appropriated and credited to Crowfoot, the Blackfoot chief, who is popularly supposed to have spoken a version of them on his deathbed, on 25 April 1890. 'What is life? It is a flash of a firefly in the night. It is a breath of a buffalo in the winter time.'[19] The African glow-worm morphs into the firefly (rare, but not unknown in Montana); oxen into buffalo — more culturally suitable for a Native American utterance — but the words appear to be apocryphal, despite being frequently credited to Crowfoot since, it appears, 1938. Yet in this we see something of a divergence between the sidereal associations that cluster around highly mobile, if ephemeral, fireflies and the role played by the earthbound glow-worm. This is strongly brought home in a poem by Manley Hopkins — Gerard's father — that opens his collection *Spicilegium Poeticum* (1892). Inspired by a painting by Tony Johannot at the 1848 Paris Salon, an engraving of which forms the volume's frontispiece, this begins by sharply juxtaposing what he interprets as two sisters:

One of earth, and one of heaven
Dreaming, in the silver even.

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[17] Eugene Lee-Hamilton, Sonnet XXVI, in *Mimma Bella* (New York: Duffield, 1909), p. 53.

[18] H. Rider Haggard, *King Solomon's Mines*, ed. by Robert Hampson (London: Penguin, 2007), pp. 54–55.

[19] A very well-documented account of this strange textual transmission is given by Robert S. Carlisle, 'Crowfoot's Dying Speech', *Alberta History*, 38.3 (1990), 16–17 (p. 16).

Sisters sitting close together,
In the calm of summer weather.

All is silence deep and strong,
Binding chains upon each tongue.

As the poles, their thoughts are far. —
One hath found the evening star;

While the other's earthward sight
Rests upon a glow-worm's light.[20]

Yet this is a relatively rare denigration of the humble glow-worm. Even if it is understandably more closely associated with the earthbound than is its winged relative, this fact is customarily turned to its didactic advantage. 'Humble' was, indeed, a favourite adjective applied to this apparently insignificant brown beetle in the nineteenth century, and one that allowed it to be co-opted into conventional moralizing ends. A number of glow-worms appear in *Aesop's Fables*, and play a role in inculcating lessons of modesty, humility, and the advisability of knowing, and keeping to, one's assigned place within society. We might speculate whether Aesop, as an enslaved person, was justifying his own position to himself, but his tales, translated, were much taught in the eighteenth- and nineteenth-century schoolroom, and certainly conveyed these conservative messages.[21]

Glow-worms feature, too, in explicitly Christian moral fables, especially those aimed at young readers. *The Glow-Worm* (1831) is a short text, illustrated with woodcuts, written for the American Sunday School Union, and doubles up its instruction about the natural world with human lessons.[22] So young Frederick and Ellen learn from their father that stars appear dim during dusk, because there is so much other light — and then he takes them deeper into the countryside, where they start to see 'little stars', as Ellen calls them, in the hedgerows and grass. The father initially dissuades them from catching even one — that 'would be taking away its liberty', he states pointedly, in this Philadelphia-printed tale; he tells them they must never injure God's creatures and then delicately wraps one up in his handkerchief, so that they can take it home and

[20] Manley Hopkins, 'Le Soir', in *Spicilegium Poeticum: A Gathering of Verses* (London: Leadenhall Press, 1892), p. 11.

[21] In many of the later versions, the heavy-handedness of the moralizing was often tamped down from eighteenth-century renditions and, notably, the glow-worm fables tended to be omitted altogether. For the shifting presentation of Aesop's tales to Victorian children, see Anita C. Wilson, 'To Instruct and to Amuse: Some Victorian Views of *Aesop's Fables*', *Children's Literature Association Quarterly*, 9 (1984), 66–68.

[22] Anon., *The Glow-Worm* (Philadelphia: American Sunday School Union, 1831), p. 10.

show their mother 'the prettiest thing in the world' (pp. 12, 15). But when they display it by the light of a candle, 'how great was their disappointment on beholding a little ugly worm or grub, of a dirty brown colour, and no brighter than a piece of old leather!' (pp. 15–16). Carefully, the father places it in his hat — and shows them that, in a dark corner, and in the absence of other light, it shines once more. There is, of course, a lesson here:

> In the day time, a thousand glow-worms might creep into your path, and you not notice them any more than you would so many ants. Indeed, they have rather a disagreeable appearance to those who admire beauty alone. But at night, when the butterflies have folded their gay wings, and the flowers have closed their leaves, and even those objects which do not alter, cannot any longer please us by their loveliness, because the darkness hides them; then the poor little glow-worm clothes himself in his little but beautiful light. You then forget his ugliness if you have seen it, and if you have not, you cannot believe that he is any thing but a spark of brightness. (pp. 19–20)

This is the moment at which the mother advances the moral: 'Will not this be a lesson to my children, and teach them not to judge hastily from outward appearances?' (p. 20) — many of God's most faithful servants, because they are plain or awkward, or poor, or uneducated, are treated with contempt, or are at best overlooked. But their true beauty will shine forth, and be apparent to all, in times of adversity. 'He who gives the sun its brightness', the mother concludes, 'lights up also the little spark of the glow-worm. And he who made all things, takes care of the meanest insect on earth' (p. 24). This story is a perfect example of the fusion of natural history and Christian doctrine that, on both sides of the Atlantic, characterized one particular mode of writing for a juvenile audience.[23]

In Richard Garnett's 'The Firefly' (1890), a totally secular fairy tale aimed at adults, the Firefly takes on a very similar role to these fabular glow-worms who wisely know, or come to internalize, their proper roles and places. Once again the message is that one should not wish to be something that one is not. It features a 'most beautiful Firefly', who lives in a Magician's cottage in a wood:

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[23] See Aileen Fyfe, 'Young Readers and the Sciences', in *Books and the Sciences in History*, ed. by Marina Frasca-Spada and Nick Jardine (Cambridge: Cambridge University Press, 2000), pp. 276–90; Bernard Lightman, *Victorian Popularizers of Science: Designing Nature for New Audiences* (Chicago: University of Chicago Press, 2007), especially Chapter 3, 'Redefining the Maternal Tradition', pp. 95–165; Greg Myers, 'Science for Women and Children: The Dialogue of Popular Science in the Nineteenth Century', in *Nature Transfigured: Science and Literature, 1700–1900*, ed. by John Christie and Sally Shuttleworth (Manchester: Manchester University Press, 1989), pp. 171–200.

> The light she bore with her was dazzling, yet soft and palpitating, as the evening star, and she seemed a single flash of fire as she shot in and out suddenly from under the screen of foliage, or like a lamp as she perched panting upon some leaf, or hung glowing from some bough; or like a wandering meteor as she eddied gleaming over the summits of the loftiest trees; as she often did, for she was an ambitious Firefly.[24]

But her ambition is — of course — her downfall, together, it would seem, with her sexiness. There is a considerable difference in the erotic charge that emanates from a mobile, sprightly firefly, and a far more pedestrian glow-worm. In Garnett's tale the Magician waves his wand in response to her wishes, but she is not happy as a star, nor as a steadily burning lamp — and, as an everlasting lamp in a sepulchre, who knows, behind closed doors, whether she is happy or not. Walking home from shutting her up,

> behold another Firefly darting and flashing in and out among the trees, as brilliantly as ever the first had done. She was a wise Firefly, well satisfied with the world and everything in it, more particularly her own tail. And if the Magician would have made a pet of her no doubt she would have abode with him. But he never looked at her. (p. 240)

For the Magician, it seems, is as culpable as the first firefly, falling in love with her, imagining how, if she were a beautiful woman — not an insect — he would want to give her whatever she desired. This story carries a complex weight: it is not just a warning about discontent coupled with excessive ambition, but about not letting one's emotions carry one to a place where, out of love, one offers another living creature something that is clearly not in their best interest. Indeed, there is a further moral that applies to the Magician. 'I wanted to show', wrote the married Garnett to the unmarried, unconventional, radical writer Mathilde Blind — with whom he had a highly sexualized if unconsummated relationship — 'that though he regretted the Firefly's discontent and would have done his utmost to remove it, he in his heart loved her the better for it.'[25]

Yet the lessons of fireflies and glow-worms reach beyond human relationships and matters of personal conduct. The firefly provides an exemplum of a further kind: it is an ideal illustration of Ruskin's well-known comment that 'the system of the world

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[24] Richard Garnett, 'The Firefly', in *The Twilight of the Gods: And Other Tales*, new edn (London: John Lane, The Bodley Head, 1903), pp. 238–40 (p. 238). The story was first published in *Art Weekly*, 31 May 1890, p. 114, and was not included in the first edition of *Twilight of the Gods* (1888). Blind died in 1896.

[25] Garnett to Mathilde Blind, 18 April 1870, quoted in James Diedrick, *Mathilde Blind: Late-Victorian Culture and the Woman of Letters* (Charlottesville: University of Virginia Press, 2017), p. 57.

is entirely one; small things and great are alike part of one mighty whole', a way into showing how looking attentively at one visually unremarkable insect (unremarkable in daylight, at least) opens up networks of imaginative and scientific connections and complicates disciplinary boundaries.[26] It supplies a perfect instance of the relationship between small and vast that is a cornerstone of ecological thinking, whether in the Victorian period or our own: 'watching narrowly', as pioneering naturalist Gilbert White would have it, in order to see the intertwining of individual components to the ecological whole.[27]

Fireflies pose a particular kind of interpretive challenge to the attentive observer, since on their own the impact of a single specimen is not nearly as remarkable as when one sees their lights en masse — little sparks binding and blending together. Only very rarely does a solo bioluminescent creature actually surprise (unless, as in Aesop, it starts to talk), although in Richard Jefferies's *After London* (1885), his fictional blend of post-apocalypticism and medieval revival, Felix, heading off into a forest, finds that 'the yellow spark of a glowworm shining by a bush made him set his teeth; trifling and well known as it was, the light suddenly seen thrilled him with the terror of the unexpected'.[28] He was, however, already significantly on edge, and this is more indicative than anything of Felix's state of mind, which magnifies the small and familiar into something with Gothic powers. Other insects which habitually make their impact because they are found in significant numbers, and where the individual specimen offers opportunities to speculate about the collective whole — bees, ants — allowed Victorian commentators to extrapolate from their activities a whole set of references to work, cooperation, and, by extension, to the industrial economy. Fireflies and glow-worms, however, set off an entirely different chain of responses: ones that, through foregrounding light, rather than visible, tangible matter, reference the metaphysical and supernatural rather than the world of work. Writers and artists, in comparing fireflies and glow-worms to fairies and goblins, build on the extraordinary magic of these floating dots of light or those little sparks that appear in bushes or heathland. This reference to the other-wordly can be almost imperceptible — as in Thomas Hardy's *The Return of the Native* (1878), where the tense dice-gambling scene between Venn and Wildeve is illuminated by thirteen glow-worms gathered on a foxglove leaf: the ominous number combines with the superstitious belief that picking foxgloves is unlucky, since it deprives fairies of their homes. The light would have

[26] *Works*, ed. by Cook and Wedderburn, VII: *Modern Painters*, *Volume V* (1905), p. 452.

[27] See Richard Mabey, *Gilbert White: A Biography of the Author of 'The Natural History of Selborne'* (Charlottesville: University of Virginia Press, 2007), pp. 138–67.

[28] Richard Jefferies, *After London*; *or*, *Wild England* (London: Cassell, 1886), p. 232.

been strange, as Arthur Hopkins (Gerard Manley Hopkins's brother) conveyed well in illustrating this scene when the novel was serialized in *Belgravia*: the particular details bring home the quality of foreboding. But Hardy, just as surely as other writers who spell out the associations of the creatures, manages to create a connection between a supernaturalism and impeccable, accurate observations of the beautiful displays created by these insects.

Within the English tradition, Shakespeare bears responsibility for consolidating connections between glow-worms, fairyland, and the supernatural, though not always in an entirely laudatory way. The ghost of Hamlet's father shows his realistic, rather than fanciful side when, about to depart, he notes that 'The glow-worm shows the matin to be near, | And gins to pale his uneffectual fire: | Adieu, adieu!' (I. 5. 89–91). On the other hand, in *The Merry Wives of Windsor*, the clergyman Sir Hugh Evans choreographs a troop of townspeople, dressed as fairies, who torment Falstaff: 'Pray you, lock hand in hand; yourselves in order set; | And twenty glow-worms shall our lanterns be, | To guide our measure round about the tree' (V. 5. 82–84). Given Sir Hugh's nationality, Shakespeare may here be acknowledging the prevalence of glow-worms in Celtic mythology. Most influential of all were the lines in *A Midsummer Night's Dream*, when Titania gives some orders for illumination to her elves when describing how they should best attend Bottom:

> The honey-bags steal from the humble bees,
> And for night-tapers crop their waxen thighs
> And light them at the fiery glow-worm's eyes,
> To have my love to bed and to arise. (III. 1. 174–77)

When Victorian painters took this Shakespeare play as their subject, however, they did not depict this peculiarly fiddly piece of handiwork, but, rather, used glow-worm and firefly light — or at least implicit allusions to it — as a generalized source of uncanny illumination. As in many other examples within the popular Victorian genre of the fairy picture, sparks of light float around the figures.[29] Even if England possessed no fireflies dancing around the evening sky, their effects, together with those of glow-worms, were borrowed to help give ethereal illumination to these scenes. Sometimes the intensely glowing lighting emanates from the fairy figures themselves, as in Noel Paton's *The Quarrel of Oberon and Titania* (1849), where an orb of light hovers just above Titania's

[29] For Victorian fairy painting, see Nicola Bown, *Fairies in Nineteenth-Century Art and Literature*, Cambridge Studies in Nineteenth-Century Literature and Culture, 33 (Cambridge: Cambridge University Press, 2001); and Jeremy Maas and others, *Victorian Fairy Painting* (London: Royal Academy of Arts, 1997).

gossamer-winged shoulders, as though turning her into a firefly. Sometimes, the details stick closer to Shakespeare's text. In Francis Danby's *Scene from 'A Midsummer Night's Dream'* (1832), wriggly-shaped glow-worms are being unmistakably waved around on sticks to light the way. Likewise, in John Simmons's *A Scene from 'A Midsummer Night's Dream'* (1873), tiny fairies glide around with luminescent glow-worms on the end of little wands (*Fig. 1*). In Edward Robert Hughes's *Midsummer Eve* (*c.* 1908), a watercolour related to Shakespeare's play by its title, if little else, a woman clad in a flowery gown that manages to be both elaborate and suggestively skimpy, stands in a woodland glade full of little people, who seem to be holding up glow-worms in globular lantern bowls for her amazement and delight (*Fig.* 2). Perhaps most magically of all, Arthur Rackham's 1908 illustration *The Meeting of Oberon and Titania* shows little bubbles of cold blue light floating in the grey-indigo sky, their luminescence blending with that of the stars themselves, echoing the many naturalists who turned to a comparison with celestial illuminations (*Fig. 3*).

Fig. 1: John Simmons, *A Scene from 'A Midsummer Night's Dream'*, 1873, watercolour on paper, 72.5 × 95.9 cm. Private collection. Wikimedia Commons.

Fig. 2: Edward Robert Hughes, *Midsummer Eve*, *c.* 1908, watercolour and gouache on paper mounted on cardboard, 114.4 × 76.2 cm. Private collection. Wikimedia Commons.

Fig. 3: Arthur Rackham, *The Meeting of Oberon and Titania*, 1908, pen and black ink and watercolour on paper, 21.8 × 34.2 cm. Private collection. Wikimedia Commons.

Moving even further away from Shakespeare, glow-worms and fireflies turn up in a whole range of Victorian fairy paintings. Sometimes their powers latch onto the qualities of other insects, as with Amelia Jane Murray's *The Moth Fairy* (*c.* 1860), where a diaphanously clad female form travels on a brown moth's back, effectively transforming it into a firefly. Likewise, they make appearances in the pages of fairy tales gathered from a wide variety of cultures. In 'The Prince of the Glow-Worms', a particularly strange German fairy story in Anthony R. Montalba's *Fairy Tales from All Nations* (1849) — illustrated by Richard Doyle, who draws a very clear visual analogy between glow-worms and stars — a young boy, Julius, becomes lost in a forest, and sings to the glow-worms as night falls, asking for their help. And then

> a thousand glow-worms at the very least came from all sides. Some hung themselves on the leaves like little coronets of lamps. Others lay like scattered gems on the moss; whilst others again circled round him executing the most intricate figures. A great number fixed themselves in the boy's fair hair, — so that he seemed to wear a starry crown.[30]

[30] Anthony R. Montalba, *Fairy Tales from All Nations* (London: Chapman & Hall, 1849), pp. 41–70 (p. 46).

In the ensuing narrative, they tell him that they might *appear* as glow-worms, but they are in fact elves, from India. Julius shrinks to their size; one reveals himself to be his mother, delighted to be reunited with her elfin prince-child, and (after very responsibly swearing allegiance to their constitution), he is transported back to India with them — which seems to be a very acceptable solution to the fact that he never fitted in easily to his European family. But less benign is the firefly in the American volume *The Fairy-Folk of Blue Hill* (1895) that refuses to help the girl Wassa find her way out of a cranberry bog, as payback for all the children before her who have thoughtlessly captured his relatives as luminous playthings.[31] For once, in the realm of fancy, fireflies are not here seen as the helpmeets of humans, or as surrogates that have human desires projected onto them, but as creatures in their own right, much as the anonymous author of *The Glow-Worm* was careful to impress on their young readers that luminous beetles belong in nature, not in the home.

Above all, what these and many other examples demonstrate is a widespread consolidation of ecology and antiquarianism: one that can be seen in the gathering of folklore which became attached to particular creatures in particular places. However global the phenomenon of fireflies and glow-worms, these legends and linguistic variations granted a form of localized ownership through their foregrounding of regional beliefs and terms. Within Europe this can be interpreted as part of a broader movement in which local lore and dialect words were gathered as a kind of implicit prophylactic against urban-driven homogenization; a desire to retain as much highly specific local knowledge as possible. Thus the notable Italian philologist and man of letters Angelo de Gubernatis, in his *Zoological Mythology* — translated into English in 1872 — notes that in Tuscany children sang a song when fireflies first appeared in the early summer threatening them with a flogging; and he records the Sicilian term for fireflies, *cannilicchia di picuraru* — little candle of the shepherd — with the shepherd, or the celestial pastor, being the sun: to carry a firefly home is to bring good luck into the household.[32] Joseph Wright, in his *English Dialect Dictionary* (1898–1905), records numerous local terms in England for the glow-worm, including shiny-bug (Kent), fairy lanthorn (Durham), glare-worm (Isle of Wight), glaze-worm (East Anglia), and stare-basin (Somerset).[33] P. V. Ramaswami Raju drew material from familiar Indian

[31] Lily F. Wesselhoeft, *The Fairy-Folk of Blue Hill* (Boston: Knight, 1895), p. 126.

[32] Angelo de Gubernatis, *Zoological Mythology; or, The Legends of Animals*, 2 vols (London: Trübner, 1872), II, 212–13. For further examples of European firefly lore, see Stefan Ineichen, 'Light into Darkness: The Significance of Glowworms and Fireflies in Western Culture', *Advances in Zoology and Botany*, 4 (2016), 54–58 <https://www.hrpub.org/download/20170130/AZB2-11408502.pdf> [accessed 3 October 2022]. For fireflies in a more global context, see Gene Kritsky and Ron Cherry, *Insect Mythology* (San Jose: Writers Club Press, 2000).

[33] *The English Dialect Dictionary*, ed. by Joseph Wright, 6 vols (London: Frowde; New York: Putnam's Sons, 1898–1905), II: *D–G* (1900), pp. 285, 634, 636; V: *R–S* (1904), pp. 387, 732.

sources in his 1887 *Indian Fables*, which opens with a glow-worm asking a jackdaw if he wants to eat all the glow-worms emerging from a fire. The jackdaw proceeds to try to do so, only to burn his mouth, leaving the glow-worm to comment, smugly, 'Wickedness yields to wisdom!'.[34] As white anthropologists started to gather narratives from Native Americans and circulate them in print, so records of firefly traditions became enriched still further: from Henry Rowe Schoolcraft's translation of an Ojibwe chant — 'Flitting-white-fire-insect! waving-white-fire-bug! give me light before I go to bed! give me light before I go to sleep. Come, little dancing white-fire-bug! Come little flitting-white-fire-beast! Light me with your bright white-flame-instrument — your little candle' — to Cosmos Mindeleff's description of Navajo (Diné) homes.[35] Here, he recounts that the heat for a Navajo sweat lodge originally came from Firefly igniting the dust produced when First Man rotated a spindle of wood in a notched stick, with the spark of fire that Qasteéjīni had given him for that purpose.[36]

It is hard to call a halt when it comes to gathering together the very many different nineteenth-century references to fireflies and glow-worms across many forms of writing. And, like fireflies themselves, these references multiply the more that one looks — and then dance around, like dots of light, for so many references are just that: passing mentions that intensify the beauty or strangeness of a night scene; that deepen the impression of a Tuscan idyll; that are used to suggest the presence of something other-worldly; that are in themselves very brief — as Sydney Lever put it in 1883, self-deprecatingly explaining the title of her volume *Fireflies: Ballads and Verses*, their mentions constitute 'a few transient flashes and darkness between!'.[37] Only short lyric poems and fables, or vignettes in stories designed to impress natural history lessons on children, focus attention on these luminous insects in any sustained way — as when

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[34] 'The Glow-Worm and the Daw', in *Indian Fables*, coll. and ed. by P. V. Ramaswami Raju, 2nd edn (London: Swan Sonnenschein, 1901), pp. 1–2 (p. 2).

[35] Henry Rowe Schoolcraft, *The Indian in His Wigwam; or, Characteristics of the Red Race of America* (Buffalo: Derby & Hewson, 1848), p. 230.

[36] Cosmos Mindeleff, 'Navaho Houses', in *Seventeenth Annual Report of the Bureau of American Ethology, 1895–96, Part 2* (Washington DC: Government Printing Office, 1898), pp. 469–517 (p. 501). All the same, as a counterbalance to all these accounts of fireflies and glow-worms, we should note that their powers were not universally considered beneficent. Most notably, among the beliefs of the Ewe people of West Africa (inhabiting an area spanning Togo and Ghana), the malevolent, vampiric Adze takes the form of a firefly, entering a house at night, and either draining the blood of its victims or possessing their souls. Most probably the origins of this story lie in warnings against malaria-bearing mosquitoes, but after Christian missionaries introduced their teachings to the Ewe, so the figure of the Adze came to take on many of the characteristics of the devil. Rather than a figure for the liberation of the soul, in this instance the firefly, as Adze, becomes an instrument of possession. See Brian P. Levack, quoted in Emma Starer Gross, 'In West Africa the Adze is an Insectoid Source of Misfortune', *Atlas Obscura*, 26 October 2020 <https://www.atlasobscura.com/articles/monster-mythology-adze> [accessed 3 October 2022].

[37] Sydney Lever, *Fireflies: Ballads and Verses* (London: Remington, 1883), p. vii.

Frank, in Maria Edgeworth's eponymous set of stories (1803), learns that one does not need a lantern when one is looking for a glow-worm, and that when one places a glow-worm on one's hand, it does not burn.[38] The only real exception that I have found is an extended narrative, written in pretty dreadful doggerel ('Perchance, indeed, the wooing Frog | May see by you which way to jog') by William Manning, *The Glow-Worm* (1896), with illustrations by Westley Horton that feebly display the influence of Aubrey Beardsley, and a striking, if awkwardly designed cover by Charles Holme that shows illumination radiating from a glow-worm as if from a miner's head lamp (*Fig. 4*).[39]

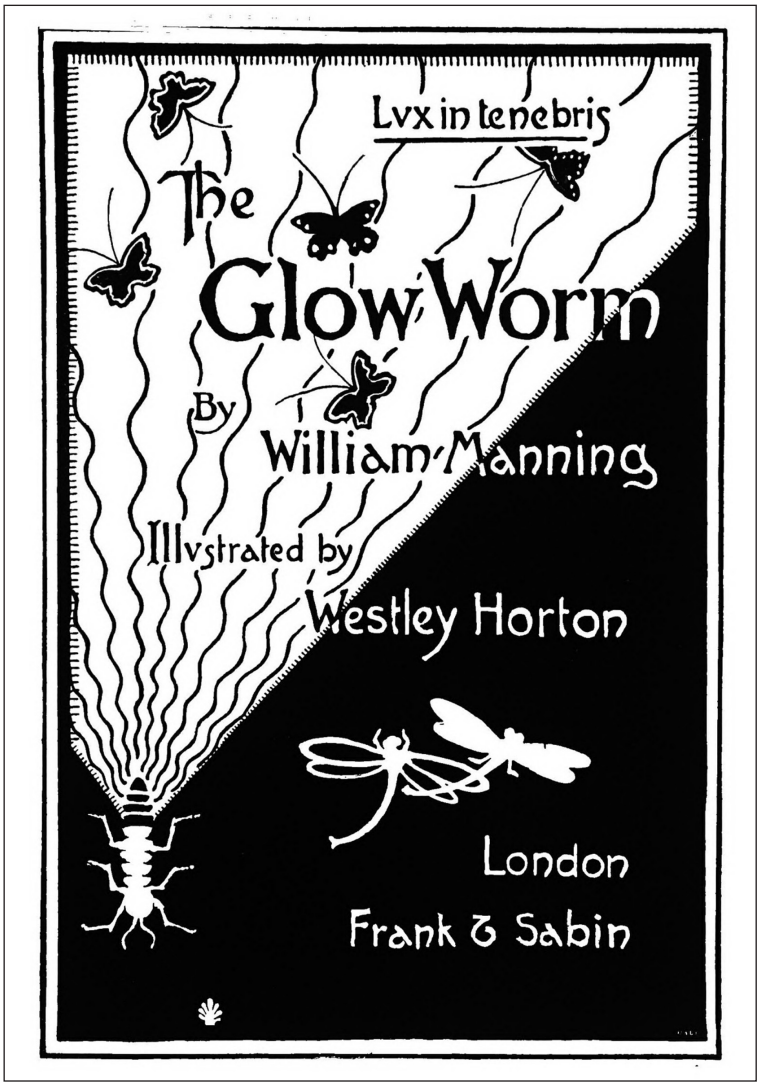

Fig. 4: Jacket design by Charles Holme for William Manning, *The Glow-Worm* (London: Sabin, 1896).

[38] Maria Edgeworth, *Frank: Complete in One Volume* (New York: Harper, 1836), pp. 52–53.

[39] William Manning, *The Glow-Worm* (London: Sabin, 1896), p. 3.

So potent is the imaginative potential of the firefly, however, that it spills right over into scientific enquiry. Gilbert White himself, elaborating on his understanding of *why* glow-worms glowed — the female attracting the male — readily ties in the natural history to mythological patterns, thereby elevating the romantic endeavours of this tiny beetle:

> For see, the glow-worm lights her amorous fire!
> Thus, e'er night's veil had half obscur'd the sky,
> Th'impatient damsel hung her lamp on high:
> True to the signal, by love's meteor led,
> Leander hasten'd to his Hero's bed.[40]

But naturalists did not have to translate their observations into heroic couplets in order to appropriate cultural references that aggrandized their subjects. When closely examined, the natural history of the firefly is very far from prosaic, not least because of the language used by those who endeavoured to explain and unlock the mysteries of bioluminescence. Physician and zoologist William Benjamin Carpenter quotes French zoologist André Duméril on fireflies, writing that 'the phosphorescent light appears to be intended by nature as the lamp of love — the pharos — the telegraph of the night, which scintillates and marks, in the silence of darkness, the spot appointed for the lovers' rendezvous', and explicitly remarks that on this occasion, the 'poetical language' seems quite appropriate for the extraordinary phenomenon of these nocturnal creatures.[41]

What distinguishes bioluminescent creatures from so many other objects of nineteenth-century naturalist enquiry is that their most exceptional aesthetic qualities unarguably lie not in their corporeal physical structure and decoration, but in their ability to emit light — as if through magical powers. This makes them different both from their obvious fairy-bearing counterparts, the butterfly and dragonfly, but also from the revelation of beauty that can be brought about through optical prosthetics, turning the microscope's lens onto the wing of a dragonfly, or the tongue of a blowfly, or a feather. In the nineteenth century fireflies are considered by biologists not only alongside their close larviform relative, the glow-worm, but as creatures sharing common ground with some naturally radiant plants, like bioluminescent fungi, including the *rhizomorpha* found in mines (causing John Murray to search for evocative comparisons, such as 'enchanted castle' and 'like moonshine'); with the luminous creatures of the sea, such as (to use their Victorian Latin terms) *Actinozoa* and *Pyrosoma*, which 'glows like a bar of hot metal, with a white and green radiance', according to Martin Duncan, librarian

[40] Gilbert White, 'To Thomas Pennant, Esquire: The Naturalist's Summer Evening Walk', in *The Natural History of Selborne*, ed. by Anne Secord (Oxford: Oxford University Press, 2013), p. 56.

[41] James Rennie, *Insect Architecture*, 3 vols (London: Knight, 1829), III, 222.

to the Zoological Society of London, writing in 1879; and with the menacing-sounding *gorgonoids*, leaving tracks of wandering light.[42]

For much of the century, only rather vague explanations could be given for the biology responsible for these systems of attraction, warning, defence, and communication. Duncan, for example, explained that 'all this vibration, this consequence of intensely rapid molecular motion, is the result of the energy of life' — a very imprecise explanation (p. 227). But this did not prevent both amateur and professional scientists from accumulating and sharing their observations, which subsequently function as a record — albeit a somewhat haphazard record — of where fireflies or glow-worms were observed, on what dates they were first seen, and how prolific they appeared to be. In our own times these archives of luminescent sightings provide an indication of habitats lost and of increasing light pollution.

Some firefly debates were more specific. A decidedly meandering discussion at a meeting of the Entomological Society of London on 1 May 1865 went back and forth on whether fireflies flash in unison or not (in fact, some do; most do not). What emerges from this is the global interest in observing the habits of these still-puzzling creatures.[43] In 1918 renowned American zoologist Edward S. Morse — who probably first became interested in firefly flashes on one of his trips to Japan — shows that this question of synchronization (do they? don't they?) was still very much a live debate in an article titled 'Fireflies Flashing in Unison' published in *Science*. What stands out in this piece is the inclusion of a letter sent to him in 1916 by naturalist Olaf Nylander from Caribou, Maine, who had noticed the phenomenon of synchronicity one particularly damp evening a few years back: 'the flashes were not perhaps as regular as an army officer would like to see in regimental drills but were so rhythmic that any one would take note of their action.'[44] During a time of war, the language has shifted from that of fairies to a decidedly militaristic register. For a brief moment in firefly literature, the prosaic won out.

To understand the firefly's beauty, or rather, what produces it, is pretty much to fulfil Wordsworth's apprehension about science's relationship to nature being that of 'murder[ing] to dissect'.[45] Even so, strangeness, rather than solutions, could emerge from dissecting a firefly. Charles Darwin wrote in *The Voyage of the Beagle* (1839)

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[42] John Murray, *Researches in Natural History*, 2nd edn (London: Whittaker, Treacher, & Arnot, 1830), pp. 119, 120; P. Martin Duncan, 'Some Facts and Thoughts about Light-Emitting Animals', *Popular Science Review*, n.s., 3 (1879), 225–42 (p. 227).

[43] 'Meeting of the Entomological Society of London, 1 May 1865', *Transactions of the Entomological Society*, 3rd ser., 2 (1864–66), 92–97 (pp. 94–95).

[44] Edward S. Morse, 'Fireflies Flashing in Unison', *Science*, n.s., 48 (26 July 1918), 92–93 (p. 93).

[45] 'Sweet is the lore which nature brings; | Our meddling intellect | Mis-shapes the beauteous forms of things; | — We murder to dissect.' 'The Tables Turned' (1798), in *William Wordsworth: The Major Works*, ed. by Stephen Gill (Oxford: Oxford University Press, 2008), pp. 130–31 (p. 131).

that fireflies flashed more brightly when irritated — he poked them with a needle — and of the even stranger fact that 'when the insect was decapitated the [glowing abdominal] rings remained uninterruptedly bright' for up to twenty-four hours after the insect's death.[46] However, research into bioluminescence intensified in the late nineteenth century, especially as a result of the work of the French pharmacologist Raphaël Dubois. Dubois refuted the commonly held idea that it was related to phosphorescence, proving — in an experiment using bioluminescent clams, repeated with a bioluminescent click beetle — that it resulted from the interaction between a heat stable organic molecule that he called luciferine (later luciferin), and an enzyme he labelled luciferase.[47] In 1920 Princeton physiology professor E. Newton Harvey published *The Nature of Animal Light*, giving an extremely useful account of research into bioluminescence up to this point — whether in algae or decaying wood, jellyfish or bacteria, the St Elmo's fire that appears at the top of ships' masts or the will-o'-the-wisps that dance over marshland.[48] In this world of glittering light, Harvey spends a page discussing the structuring of fireflies' photogenic cells, but he soon moves back to shrimp. Yet fireflies continued to attract plenty of researchers. As *lampyrid* specialist Frank A. McDermott wrote in *The Fireflies of Delaware* (1958), which provides another useful summary of research at that time, 'if the fireflies were of great economic interest the amount of study devoted to them would be popularly more understandable, but while they undoubtedly have their niche in the economy of nature', they can hardly be regarded as economically important as pests, nor as predators on pests.[49] What they *do* have going for them, as compelling objects of scientific study, are the mysteries of their luminosity which, as he notes, is what has drawn poets, composers, and even joke writers to them.[50]

In our own century research into fireflies has accelerated yet more — Sara Lewis's annotated bibliography to *Silent Sparks* (2016) is invaluable in explaining the advances in understanding that have taken place.[51] All the same, it was only in 2014 that a team of scientists from Switzerland and Taiwan, using state-of-the-art imaging techniques,

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[46] Charles Darwin, *The Voyage of the Beagle* (New York: Collier, 1909), p. 40.

[47] For a clear, concise history, see John Lee, 'Bioluminescence: The First 3000 Years (Review)', *Journal of Siberian Federal University, Biology*, 3 (2008), 194–205 <http://doi.org/10.17516/1997-1389-0264>.

[48] E. Newton Harvey, *The Nature of Animal Light* (Philadelphia: Lippincott, 1920). See also his *Bioluminescence* (New York: Academic Press, 1952).

[49] Frank A. McDermott, *The Fireflies of Delaware: With General Notes on Fireflies* (Wilmington, DE: Society of Natural History of Delaware, 1958), p. 5.

[50] A firefly joke: 'Q. Why did the spider eat the firefly? A. It wanted a "light" snack.' jjneal, 'Firefly Jokes', *Living with Insects Blog*, 10 August 2011 <https://livingwithinsects.wordpress.com/2011/08/10/firefly-jokes/> [accessed 3 October 2022].

[51] Sara Lewis, *Silent Sparks: The Wondrous World of Fireflies* (Princeton: Princeton University Press, 2016).

determined exactly *how* fireflies and glow-worms produce their light, by controlling the oxygen distribution to the light-emitting cells in their abdomen: basically, they have the capacity to divert this flow of oxygen to and from cells performing other functions.[52] As Lewis makes clear, however, these are precarious times and, in many places, fireflies are becoming increasingly uncommon. They are victims of commercial harvesting (for displays and decorations in twentieth-century Japan; for their luciferin at the hands of the Sigma Chemical Company and other entities); of habitat loss, especially of wetlands; of river pollution; of pesticide spraying; of light pollution. As Henry David Thoreau put it: 'What were the fireflies light, if it not for darkness?' (*Writings*, IV, 146 (25 June 1852)) — without darkness, fireflies dwindle. Furthermore, their diminishing numbers is part of a greater pattern of insect extinction: one that, contemporary scientists are suggesting, may threaten the existence of us all. In other words, some of this increased attention to fireflies is driven by ecological urgency, as well as by the fascination they continue to provoke.

'Fireflies', as Lewis concludes, 'offer us the gift of wonder' (p. 14). The magic of fireflies persists — and the wonder they provoke is reason enough to fight for their preservation and the preservation of their habitats. By way of conclusion, however, I want to introduce a completely artificial environment: a work by the contemporary Japanese artist, Yayoi Kusama. On the second floor of the Phoenix Art Museum, there is an extraordinary installation by Kusama — one of her mirrored Infinity Rooms: *You Who Are Getting Obliterated in the Dancing Storm of Fireflies* (2005).[53] It was inspired by a Japanese folk tale about a person in a field with ten thousand fireflies, but it draws, too, on the venerable Japanese tradition of *hotaru gari*, or firefly watching, and on a far deeper set of cultural associations. As Lewis tells us: 'In Japanese culture, fireflies are like glowing pearls, steadily accreting value with each new layer of symbolic meaning' (p. 3). A rich account of such meanings is given by Lafcadio Hearn, the notable mediator between Japanese and Western culture in the late nineteenth century, in his *Kottō* (1903), illustrated by Genjiro Yeto (*Fig. 5*). Hearn collects numerous firefly legends; describes both commercial firefly hunters and children gathering them for fun; briefly surveys firefly science; compiles a selection of traditional firefly poems; and describes what one might see on a summer's evening on the Uji River, should one take one of the excursion trains laid on for the purpose:

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[52] Yueh-Lin Tsai and others, 'Firefly Light Flashing: Oxygen Supply Mechanism', *Physical Review Letters*, 113 (December 2014) <https://www.researchgate.net/publication/270342787_Firefly_Light_Flashing_Oxygen_SupSup_Mechanism> [accessed 3 October 2022].

[53] For Yayoi Kusama's fascination with representations of infinity, see *Yayoi Kusama: Infinity Mirrors*, ed. by Mika Yoshitake (Munich: Prestel, 2017).

> The stream there winds between hills covered with vegetation; and myriads of fire-flies dart from either bank, to meet and cling above the water. At moments they so swarm together as to form what appears to the eye like a luminous cloud, or like a great ball of sparks. The cloud soon scatters, or the ball drops and breaks upon the surface of the current, and the fallen fireflies drift glittering away.[54]

Fig. 5: Genjiro Yeto, illustration to *Kottō: Being Japanese Curios, with Sundry Cobwebs*, coll. by Lafcadio Hearn (New York: Macmillan, 1902), p. 136. Project Gutenberg.

Visiting Kusama's *Dancing Storm* offers nothing like this experience of unpredictability — but that does not stop it being strangely magical. You stand on a polished black granite floor, under a black plexiglass ceiling, in a pitch-black,

[54] 'Fireflies', in *Kottō: Being Japanese Curios, with Sundry Cobwebs*, coll. by Lafcadio Hearn (New York: Macmillan, 1903), pp. 135–69 (p. 143). For more about Hearn and his interest in fireflies — and Japanese insects more broadly — see David B. Lurie, 'Orientomology: The Insect Literature of Lafcadio Hearn (1850–1904)', in *JAPANimals: History and Culture in Japan's Animal Life*, ed. by Gregory M. Pflugfelder and Brett L. Walker, Michigan Monograph Series in Japanese Studies, 52 (Ann Arbor: Center for Japanese Studies, University of Michigan, 2005), pp. 245–70.

mirror-lined room. Two hundred and fifty LED lights hang from this ceiling, designed to flicker on a continuous 2½-minute loop. These lights are very similar, incidentally (but probably coincidentally) to those that contemporary biologists use to attract fireflies for observation. Like one's experience of Kusama's earlier work, *Fireflies on the Water* (Whitney Art Museum, 2002 — and subsequently installed in a variety of different locations), in which a hundred and fifty lights dangle over shallow water tanks, to look at *Dancing Storm* — or rather, to stand in the middle of it — is to become immersed in wonder, and to experience, for a while, infinity.

Kusama's project, involving many dancing electric dots of light, is, of course, in some ways a deeply ironic one. Rather than taking us out into twilit woods or meadows, she uses artificial fireflies to evoke the amazement that tiny elements of the natural world can still produce. Both fireflies and LED lights en masse, with us as participant observers in darkness, can point to our own individual smallness, mere spots of light in the universe, or, for that matter, mere nodes within electronic networks. Kusama's work also serves to bring home, too, the blurred terrain between nature and culture, human and non-human, and between past, present, and future in ecological aesthetics.

Indeed, standing among these artificial fireflies means experiencing something very like Ruskin's evening in Pistoia, twenty-five years before the visit to Siena with which I began this piece. He wrote to his father:

> I have just come in from an evening walk among the stars and fireflies. One hardly knows where one has got to between them, for the flies flash, as you know, exactly like stars on the sea, and the impression to the eye is as if one was floating on water. I was not in the least prepared for their intense brilliancy. They dazzled me like fire-works, and it was very heavenly to see them floating, field beyond field, under the shadowy vines.[55]

Intense though Ruskin's experience was, however, naturally produced flashes of light do not have to be spectacular in scale and intensity to create wonder — whether this wonder be appropriated for the experiences and memories of an individual, whether it provokes scientific curiosity, or whether it comes to stand for the extraordinary beauty, yet fragility, to be found in our natural environment. What counts is the paradox that was well recognized by nineteenth-century firefly aficionados: the idea that the small, the dull-coloured, and the apparently insignificant, can contain the sublime.

[55] John Ruskin to his father, 28 May 1845, quoted in *Works*, ed. by Cook and Wedderburn, XXXV, 562, n. 1.