

Light into Darkness: The Significance of Glowworms and Fireflies in Western Culture

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Abstract The lamproyids (Coleoptera: Lampyridae) belong to the few insects that have been named and observed accurately for thousands of years. The most common names in European languages are formed as diminutives of light and related terms or they are composed of a term like light, fire and glow in combination with bug, fly or worm. There is a huge variety of idiomatic names – in Italian dialects e.g. about 500 different expressions denominating species like *Lampyrus noctiluca* or *Luciola italica* are reported. Beyond that, lamproyids are interpreted as signs or used as metaphors in a wide range of the semantic field. Thus, the notion of lamproyids leads to a vast network of associations including such distinct and even contradictory significances as childhood, crop, doom, elves, fear, habitat change, idyll, love, luck, mortality, prostitution, solstice, stars and fleetingness of words and cognition. All these connotations are evoked by six features of the observed lamproyids: light in the darkness, season of appearance, mating, direction of flying in the case of species like *Lamprohiza splendidula* and *Luciola* sp., flashing (of *Luciola*-fireflies) and finally disappearance of lamproyids in landscape and perception. The examples of the presence of lamproyids in literature, visual arts, music and evidence in traditional popular culture collected in past years show that the accent of the connotations is shifted by the change of cultural context: in early times the seasonal indication was relevant for the agricultural calendar, the romantic connotations had their golden age during Belle Époque while in recent decades the associations circle around the disappearance of glowworms and fireflies. Although, the observer is not normally aware of the full richness of significances, the extraordinary complexity of connotations is an important factor for the fascination produced by lightning bugs during summer nights.

Keywords Glow-worms, Fireflies, Lampyridae, Sign, Icon, Index, Culture

1. Introduction

Fireflies are highly interesting and useful model organisms for the investigation of various biological issues [1], but beyond their value for scientific research they radiate a fascination catching both scientists and non-scientists – as French entomologist Jean-Henri Fabre quoted a century ago: “Few insects in our climes vie in popular fame with the Glow-worm, that curious little animal which, to celebrate the little joys of life, kindles a beacon at its tail-end.” [2] Fabre, renowned for his careful and precise observations as well as for his poetic descriptions, states not only the extraordinary popularity of glow-worms but associates the beetle bioluminescence with the celebration of the “little joys of life”.

However this is only one of a huge number of different emotive and cognitive connotations connected with glow-worms in particular and fireflies in general. The notion of lamproyids leads to a vast network of associations including such distinct and even contradictory significances as childhood, crop, doom, elves, fear, habitat change, idyll, love, luck, mortality, prostitution, solstice, stars and fleetingness of words and cognition. Indeed we encounter fireflies as carriers of meaning wherever they exist on earth – and even in space when John Glenn, first American orbiting the earth, reports in 1962 from his Mercury mission circling the globe the observation of “literally thousands of tiny luminous objects that glowed in the black sky like fireflies”[3].

How can lamproyids get such rich and diverse fields of connotations, which leave behind traces in human culture from ancient times until the space age? The following deliberations try to approach the questions:

- Which semantic fields, significations, cognitive and emotive connotations are connected with lamproyids?
- How are these connotations connected with features of lamproyids?

Even though there exist ample traditions concerning fireflies in Japan and other extra-European cultures here the focus lies on the considering connotations in European and Western traditions.

2. Materials and Methods – Fireflies and Semiotics

Corresponding passages in stories, poetry, theatre, folktales, songs and movies were collected to get an overview on the appearance of fireflies in a cultural context, as well as idiomatic expressions, popular traditions, paintings, prints and other kinds of illustrations related to glow-worms and fireflies. This collection happened accidentally by more or less random findings or hints and was complemented by systematical research on the Internet checking terms for glow-worms and fireflies in different languages.

Based on similar significations the collected occurrences were arrayed in groups labeled with keywords indicating different connotations, e.g. hope, bread or mortality.

To understand these connotations in their correlation with features of lampyrids some basic terms of the theory of signs according Charles Sanders Peirce were used, especially Peirce's definitions of iconic and indexical relation between signifying signs and signified objects [4].

A sign is an icon, if the signified object is related to the signifier through similarity or resemblance as in the case of a photo referring to the photographed object through visual likeness – although there is no material identity between the photo and the depicted object.

On the other hand an indexical sign utilize a causal relationship or a correlation in space or time as connection between it and its object. A molehill is an index for a mole, a hand signal may be an indexical sign for a direction or a place.

With Eco [5] connotations are understood as cultural unities, which a signifier may recall to the mind of a recipient depending on cultural availability. In a further step features of “real” fireflies were searched which are able to evoke connotative significations in the sense of icons or indexes. And finally these features were arranged as nodes in a network of connotations.

3. Results – A Network of Connotations

3.1. A Small Light in the Night

The most conspicuous feature of lampyrids is the ability to produce light. In different European languages fireflies are named as (beings with) small light, so in Italian (*luciola*), French (*luciole*), Czech (*světluška*) or Croatian (*svitac*). In other languages the terms for lampyrids derive from a

combination of designations related to the light emission (glow, light, fire) with non-specific animal names like worm, bug or fly: English glow-worm, firefly and lightning bug, German *Glühwürmchen* and *Leuchtkäfer* or French *ver luisant* and *mouche à feu*. In some languages there exist a variety of often local names for lampyrids: In Portuguese we find around 40 variants [6] and the list of contents in a study of firefly names in Italian includes approximately 480 idiomatic expressions [7]. Denominations for lampyrids evidently existed already thousands of years ago. As far as we know in Greek and Roman antiquity only a dozen beetle “species” were distinguished and labeled with a special denomination, among them the fireflies [8].

As long as there were very few sources of artificial light during the nightly darkness natural light phenomena were restricted more or less to lightning flashes, moon and star light (and the beetle bioluminescence was therefore sometimes compared with these atmospheric and cosmic light sources). Glow-worms and fireflies constituted a small but strong contrast with the surrounding darkness, which allowed the lampyrids to become an iconic sign for hope, a positive glimmer of light in an unclear and threatening setting. Maybe the most impressive expression of these connotations is the appearance of glow-worms in the context of German concentration camps during World War II, when in Terezin under the direction of imprisoned artists children played the musical *Glühwürmchen* after the Czech children book classic *Broučci* (small beetles) written by Jan Karafiát. Significantly a report about these performances was published in 2000 under the title *Fireflies in the Dark* [9].

But glow-worms and fireflies don't only contrast with the surrounding darkness, they also inherit the atmosphere of their background. And the night itself is not only connotated in a negative way. On one side the night is threatening, puzzling and perturbing due to the poor visibility – “How easy is a bush supposed a bear!” writes William Shakespeare in his play *A Midsummer Night's Dream* (which since Max Reinhardt's *mise-en-scène* a hundred years ago is traditionally staged with glow-worm-like light effects) [10]. But on the other side night is also connected with positive features, inspires creativity, fantasy and dreams and gives cover, e.g. for lovers, as we see again in *Midsummer Night's Dream* [11].

With this simultaneously contrasting and accordant relationship to the night, which itself has contradictory impacts, the connotations of the nocturnal light of glow-worms and fireflies become ambiguous (Figure 1).

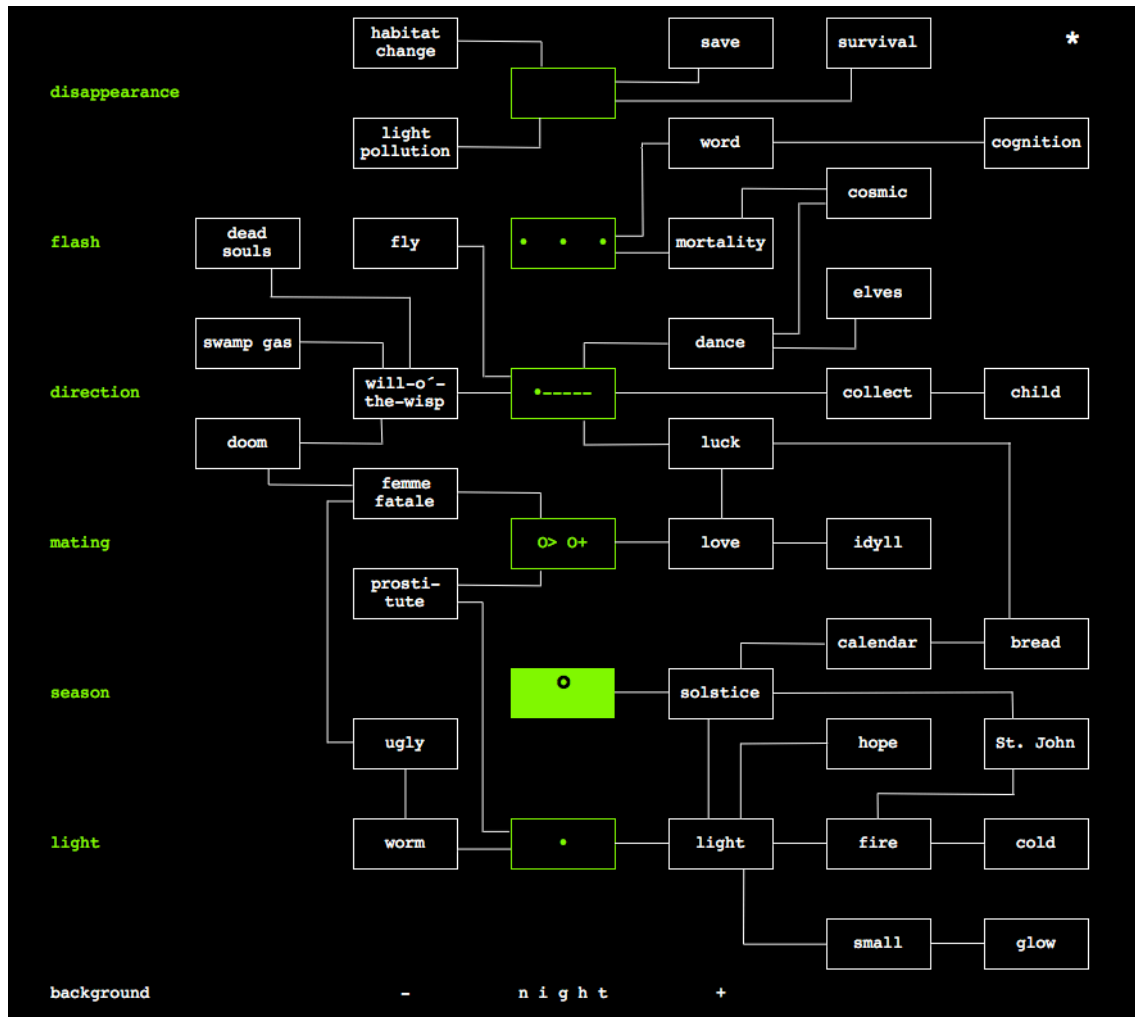


Figure 1. Network of some semantic fields (white boxes) is connotated with lampyrids in European culture. Negatively occupied fields on the left; positively occupied fields on the right side. The connotations are linked with six different features of glow-worms and fireflies (green boxes in the middle and left column). Light, mating and flash are connected with respective connotations as iconic signs (in the sense of Peirce), season, direction and disappearance as indexical signs. The firefly show takes place before a nocturnal background additionally influencing the concepts of the observed lampyrids.

3.2. Calendar Animal

In fact in parts of Central Europe glow-worms are “Midsummer animals” because they mate during the shortest nights of the year around the summer solstice. In Bavaria they are called Sunnawendkäferchen (small solstice beetles) and in different languages they are named after St. John whose feast day in the church calendar was set at June 24 exactly a half a year before Christmas and close to the longest day: Johannwürmchen (German), jonvabaliai (Lithuanian) or szentjánosbogár (Hungarian).

Earlier Roman author and naturalist Pliny the Elder (Gaius Plinius Secundus, AD 23 – AD 79) linked the luminescent activity of lampyrids with the agricultural calendar and recommended to sow millet at the moment when barley gets ripe:

“And the sign alike of the barley being ripe and for sowing these crops consists in the fields in the evening shining with glow-worms (that is what the country-people call those starlike flights of insects, the Greek name for which is

lampyrides) thanks to Nature's unbelievable kindness.” [12]

In the tradition of Val Mesocco in Southern Switzerland the appearance of fireflies is understood as a sign for the start of haymaking [13] and in parts of Northern Italy the mating season of fireflies is so strongly connected with wheat harvest that different dialect terms for the lightning beetles are derived from pane (bread), e.g. paniola [7]. No wonder that these “thanks to Nature's unbelievable kindness” helpful animals indicating crucial moments in the phenological and agricultural calendar have a predominantly positive reputation and may even be signs for luck. In Peirce's terminology these connotations based on the seasonal coincidence have the character of indexical signs.

3.3. Mating in Darkness

Already in early times it was generally believed that the female fireflies are shining to entice the male, even when naturalists of the 18th century started to discuss the issue that the observed light emissions of larval lampyrids may not

serve as copulation initializing signal [14]. Poets like Friedrich Gottlieb Klopstock (1724-1803) in his poem *Zwei Johannswürmchen* (1801) interpreted every spark of the glow-worm as expression of its love for the mating partner [15]. Around 1900 Austrian writer Arthur Schnitzler let fireflies accompany a holiday romance in his story *Der Leuchtkäfer* [16] and in Paul Lincke's song *Glühwürmchen Idyll*, which quickly achieved international popularity, a glow-worm calls lovers to follow and leads them to bliss:

“Shine, little glow-worm, glimmer, glimmer
Shine, little glow-worm, glimmer, glimmer
Light the path below, above,
And lead us on to love.” [17]

The somewhat iconic transmission of beetle mating to human romance is supported by the nocturnal background providing shelter to the intimacy of the love couple.

Ever since the song *Lucciole vagabonde* was released in 1927 [18] in Italian language *luciolina* is used as common word for prostitute, combining the mating allusion with another iconic connotation, insofar as prostitutes wait for customers in the darkness under streetlamps.

3.4. Direction

In the sense of an indexical sign the lights of flying males belonging to species like *Lamprohiza splendidula* or *Luciola italica* seem to point a direction leading somewhere – to luck or to doom: 18th century naturalist Johann Jakob Scheuchzer identifies fireflies with *ignis fatuus* or will-o'-the-wisp, atmospheric light drawing travellers from the safe paths [19]. In different European regions flying lampyrids are understood as the souls of dead [20].

But normally fireflies guide into fortunate situations, sometimes they even save by *ignis fatuus* misled persons, as in a German tale from the early 1900s [21]. These fortunate situations range from the place in the darkened movie theatre indicated by the torch of a cinema employee – in Italian also called *luciolina* – to hidden treasures [20] and romantic bliss indicated by lampyrids in the nocturnal landscape. In many countries children follow the fireflies, catch them, put them in a jar and hope that they will turn into coins during the night (which may really happen with a little help from the parents) [22].

3.5. Flash

In contrast to *Lampyrus noctiluca* some Southern European species like *Luciola italica* or *Luciola lusitanica* emit interrupted light signals. In an iconic sense the flashes in the darkness signify the tiny particles of our surroundings that we recognize in the ocean of a dark night of an understood world. In the words of historian Fernand Braudel:

“Events are like fireflies glowing much too short to illuminate the landscape. The history beside the events has to be reconstructed like the surrounding dark landscape.” [23]

Nadine Gordimer, winner of the Nobel Prize in literature, notes that a novel “cannot and does not convey the quality of

human life, where contact is more like the flash of fireflies, in and out, now here, now there, in darkness.” [24]

In fact human life itself conform a single flash of a firefly, what finds expression in the much-cited words put in the mouth of Siksika First Nation chief Crowfoot (1830-1890) as his last words:

“What is life? It is the flash of a firefly in the night.”

So the intermittent firefly flashes strikingly visualize our obviously fragmentary perception of the world as well as our mortality and the fleetingness of our life.

3.6. Disappearance

A literally very last feature of glow-worms and fireflies with a strong (indexical) sign character is their disappearance. Every scientist involved in firefly research experiences what Sara Lewis describes:

“When I mention my work, the question people most often ask is: ‘Why are all the fireflies disappearing?’” [1]

In the 1970s well-known Italian writer and filmmaker Pier Paolo Pasolini declared the apparent disappearance of the fireflies as sign for a radical change in the culture, economy and landscape of his country [25]. With his *Articolo delle lucciole* published in the daily *Corriere della Sera* Pasolini evoked a discussion which is still going on [26, 27].

And ecologists and environmentalists see the disappearance of the lampyrids in almost every area worldwide as a sign of radical changes in landscape use, increasing light pollution and decrease of biodiversity [1] – and therefore as plea for sustainable behavior in general.

4. Conclusions

The connotation network of glow-worms and fireflies in Western culture is extraordinarily rich. There are a lot of animals with a much higher value in human economics whether as useful or as harmful components of our economic systems – like cows or rats – but there exists hardly a species or a taxonomic group with such a wealth of connotations as glow-worms and lampyrids in general. The connotations lead to essential fields of human experience like hope and doom, agriculture and habitat change, love and sex and last but not least to the narrowness of our words, our cognition and even the fleetingness of our life.

To some extent it seems to be possible to deduce the connotation fields from features characterizing our perception of fireflies and to understand the transferred significances as iconic and indexical signs in the sense of Peirce's semiotics. In point of fact the presented network is simplified. Often a specific connotation field originates from interferences of different interpretations as in the case of romance and idyllic love which may be connected with features as mating and indicated direction in combination with the presence of the nocturnal background promising shelter for intimate activities of lovers and the general excitement for the “magic“ lights in the dusk.

Although the observer is not normally aware of the full

richness of significances, the extraordinary complexity of connotations seems to be an important factor in the fascination generated by fireflies during summer nights. Because of the richness of mainly positively occupied semantic fields terms for lampyrids are often used as name for restaurants and boats or products like drinks and most recently for phone technology.

The cognitive and emotive connotations are embedded in the respective cultural context depending on local and historical conditions. We note also that dominant connotations change during history according to changes in the defining ideas. In old times the focus lay on fabulous and seasonal connotations and in agricultural indications. Around 1900 the accent shifted, fireflies lost their function as indicators in the agricultural calendar but were a welcome relief from an urbanized and increasingly technical world. And in our times maybe the connotations evoked by their disappearance are increasingly important.

The study of the complex connotative network developed around glow-worms and fireflies proves that the disappearance of these species is not solely an ecological problem: When the fireflies fade from our experience, this means not only a loss in biodiversity but also a loss for human culture.

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