

## **Bioluminescent Fireflies: Phylogeny, Lifecycle and Ecology**

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### **Abstract**

Fireflies...! A childhood magic...a miracle...that we have seen in childhood sitting on some tree and twinkling, sometimes we have locked them in a stick box, we played with their light, or have seen them in marathi movies- Katyar Kaljat Ghusli, all these things are very mesmerizing.

Nature has given the philanthropy, of light to them. At some forest tourist places, particular trees covered with billions of fireflies looks like a heaven on earth. Very few researchers have published their work on fireflies. Hence there is always a question in mind that how many types of there on earth, where does they go after first week of June, what is the logic behind their tail light etc. Hence author tried to answer these questions through this manuscript.

### **Introduction**

The regional names for fireflies are juganu, minmini etc. The different colour bioluminescence emitting beetles of Lampridae family are termed as fireflies. As per the reference of fossil record notes, fireflies are the residents of earth since from last 100 million years. This fact proves that fireflies, the beetles lived with dinosaurs and survived successfully.

According to recent research literature survey, on the global platform there are nearly 2,000 discovered species of fireflies. Fireflies proved their existence on all continents except Antarctica. Fireflies are a topic of interest and research in USA, Australiya and Malaysia and hence extensively explored there but not in India. As per literature survey, there are fifty reported species of fireflies in India, distributed across the country. Group of fireflies is called a sparkle.

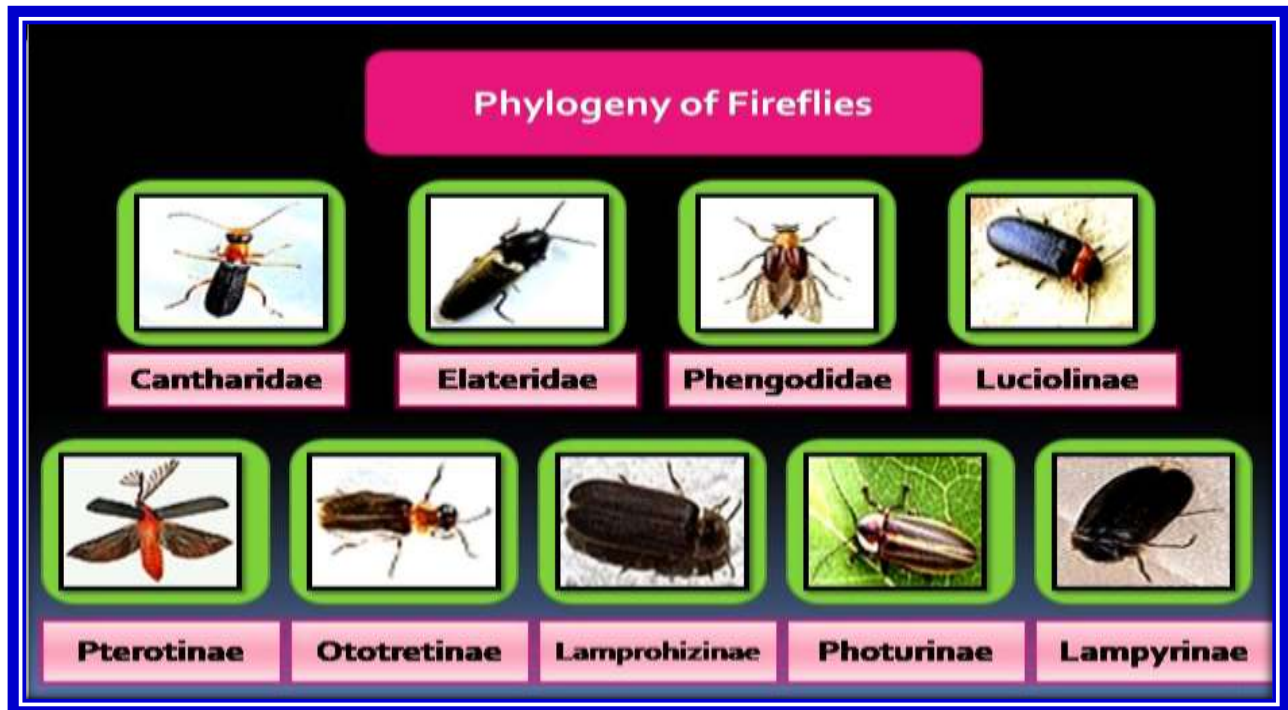
Sometimes fireflies are called as swarm. The production of light in bioluminescent organisms results from the conversion of chemical energy to light energy.

### Bioluminescence

The optical process takes place chemically in a particular organ of fireflies for emitting light is called bioluminescence. The process includes chemical light bearing enzymes luciferase and luciferin that combines in the presence of magnesium, oxygen and Adenosine Triphosphate i.e. ATP and emits light.

Abdomen of the firefly works like a lantern. There is a special cell packed with a protein called luciferin which reacts with oxygen to emit light. In most species, male and female fireflies emit different colour light signals for finding their partner.

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### Lifecycle and ecology



### Life stages of Fireflies

Fireflies like most of the insects, have four life stages viz. eggs, larvae, pupa, and adult. The average lifespan of fireflies is around two years and out of which most life they spent as a larvae.

- **Eggs**

Depending upon the species, adult firefly female lay eggs in the soil, on the ground or on aquatic plants.

- **Larvae**

Egg are hatched in around 25 days and born as larvae. This second stage of firefly life larvae lasts for two months to two years according to time of a species. After spending nearly two years into the larvae stage, it change or metamorphose. Like adult fireflies, they emit light glow but only for defence mechanism.

The larvae have three pairs of legs and are grub-like vicious predators. Larvae feed on snails, slugs or worms by injecting them with a numbing fluid. There are two types of larvae terrestrial and aquatic.

- **Pupa**

After two years spend in larvae stage it goes in the third life stage called as pupa. This pupa stage comes before the adult stage. There are two types of pupa fireflies according to their species as

1. Both the male and the female adults possess wings
2. Only male adults possess wings and females are wingless.

Pupa stage is of maximum one month duration.

- **Adult**

Pupa gets transformed into adult firefly. Firefly lives only for few weeks. There are again two types of fireflies

1. Fireflies survive on food like pollen or nectar or other fireflies.
2. Fireflies don't eat anything in whole life. They just find a partner, mate, lay eggs, and die.

### **Conclusion**

From this it is clear that the fireflies that we see in this summer of 2023 are born from eggs laid in 2021. The eggs laid in 2023, will be the parents of adult fireflies of summer 2025. Hence fireflies have a lifespan of two years. They spend their most of the life in larvae stage.

Fireflies of all species nearly look similar and hence difficult to classify without microscope.

The last stage of life of fireflies' i.e. adult stage of a firefly is only a short span of a week to a month. In adult stage they only mate, lay eggs and then after rain at the beginning of June they die.

- On the earth the existence of fireflies is across different habitats like parks, forests, marshes, mangroves, on plots etc.
- There are two prime life requirements of fireflies viz. 1.sufficient and good food for larvae stage and 2) Darkness for finding right partner and mating.
- Advance sophisticated modern camera imaging techniques are able to capture the flight patterns of fireflies. Flight pattern is the unique identity of each species. Hence such cameras are used for the determination of species-level identification. Fireflies favor moist, damp, wet regions.

## References

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