

Dinosaurs had company in the dark: Amber fossil reveals an ancient glow that lit Cretaceous nights

May 12 2026, by Sayan Tribedi



An impression of a glowing ancient firefly preserved in Burmese amber, capturing how bioluminescent beetles may have looked nearly 100 million years ago during the age of dinosaurs. Generated using AI tools for illustrative purposes.

Forget what you thought you knew about fireflies. A remarkable discovery reveals their iconic glow was already lighting up the world when dinosaurs still roamed.

Picture a moonless night in the Cretaceous, dark trees towering over everything, while little green flashes dart through the ferns. In modern times, the glints seen above would be fireflies, members of the beetle family Lampyridae. But could such "natural lanterns" really have flickered when dinosaurs still walked? The early firefly history remained a mystery until recently.

Two potential firefly specimens, both found trapped in Burmese amber, 99 million years old, were offered by the fossil record. Due to a lack of clear ancestors to study, scientists had little hard evidence of when bioluminescence first appeared.

Recently, scientists found that a beautifully preserved amber beetle is a firefly that pushes the origin of glowing lampyrids back to the age of dinosaurs through a study on amber.

Flashback in amber: A Cretaceous firefly

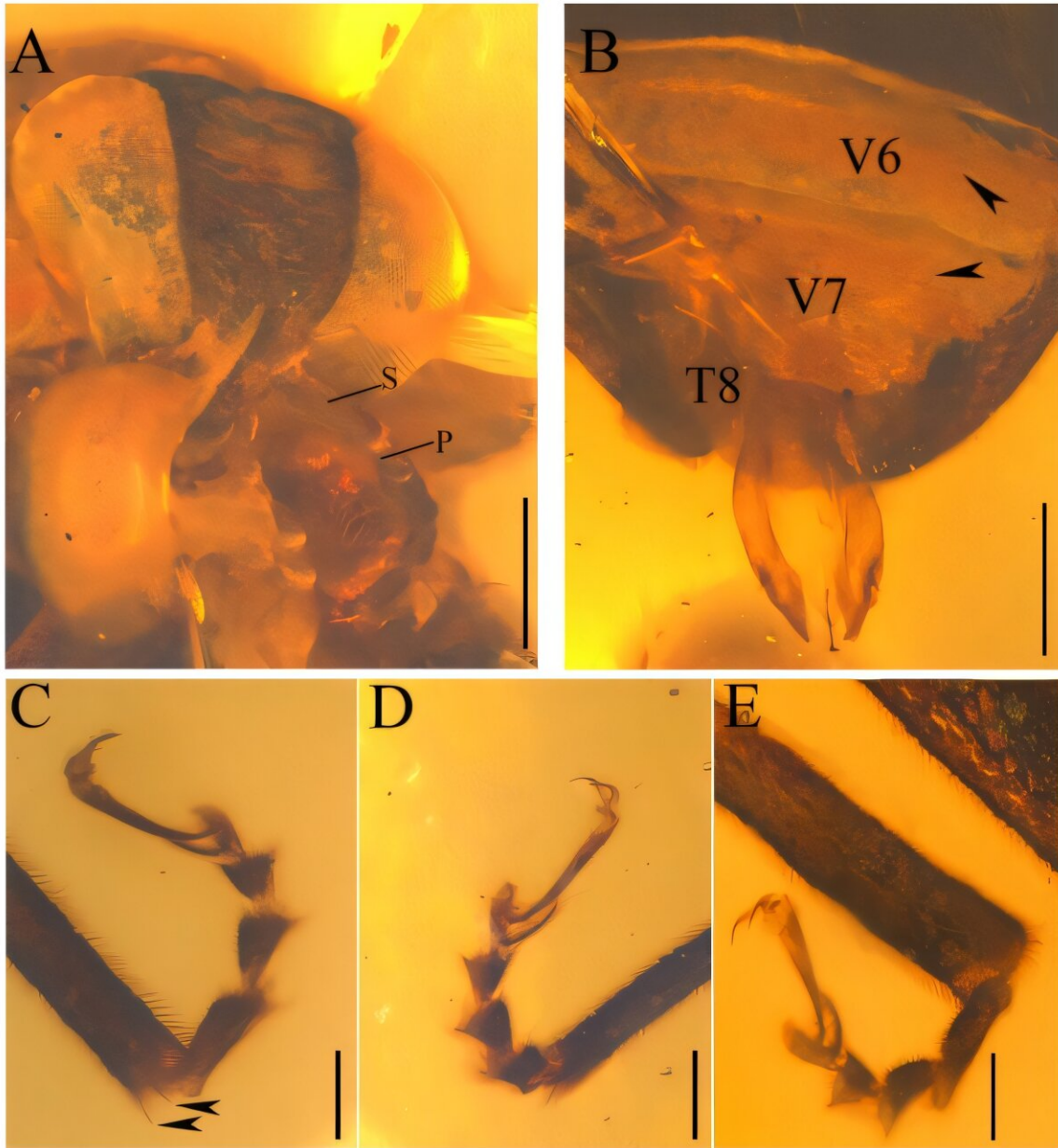
The [novel discovery](#) was unearthed within Burmese amber, which represents a fossil resin from the middle Cretaceous period (98–99 million years ago). The Burmese amber holds a diminutive male beetle with distinctly modern characteristics. The study is published in the journal *Proceedings of the Royal Society B: Biological Sciences*.

According to the study's authors, "This new taxon is characterized by large eyes, filiform antennae, six abdominal ventrites and a [bipartite light organ](#) in males."

Thus, the fossil possesses typical attributes of lucioline fireflies—an

evolutionary branch of the Lampyridae family. The latter are known for their ability to produce bioluminescence signals using their abdomens equipped with two-part luminescent organs.

By employing extensive comparative analysis based on over 400 morphological characteristics and genetic information obtained from living specimens of fireflies, scientists were able to place the fossil into the subfamily Luciolinae. In fact, the specimen represents "the first definitive Cretaceous fossil of a Luciolinae firefly," indicating an age of no less than 99 million years for modern luciolines.



Details of *Cretoluciola birmana* gen. et sp. nov. (A) Anterior part of body, ventral view; (B) posterior part of body, ventral view (arrows indicate light organ); (C) right protarsus, ventral view (arrows indicate tibial spurs); (D) left mesotarsus, ventral view; (E) left metatarsus, ventral view. Scale bars: A, B = 0.5 mm; C, D, E = 0.2 mm. Abbreviations: S, scape; P, pedicel; V6, ventrite VI; V7, ventrite VII; T8, tergite VIII. Credit: Shuailong Yuan et al, A true Luciolinae fossil from the mid-Cretaceous Burmese amber provides new insights into the early evolution of fireflies (Coleoptera: Lampyridae), *Proceedings of the Royal*

The scientists called this new species *Cretoluciola birmana*. Although tiny at just a few millimeters long, it is surprisingly detailed, with six distinct abdominal segments and a two-segment light organ, similar to those present in living fireflies. Fireflies probably used their glows in courtship and warning signals, as they do nowadays, as the features suggest.

Indeed, according to the authors, fireflies were even present 99 million years ago and had bioluminescent organs just like modern fireflies. Even the identities of the older amber fossils (genera *Flammarionella* and *Protoluciola*) are cast into doubt. Recent research suggests that the findings might not be true lucioline fireflies, indicating that Cretaceous forests likely had more firefly species than we assumed.

Illuminating firefly evolution

The team's detailed study sheds light on more than just one species. By analyzing 410 morphological traits plus genetic sequences from eight gene regions, the researchers built a family tree of fireflies. The result was nearly rock-solid: *Cretoluciola* fell in *Luciolinae* with 99.7% bootstrap support (and Bayesian probability 1.00). In other words, the evidence is overwhelming that this beetle belongs with today's lanternflies.

The fossil's anatomy also tells a story. For example, its six ventrites and well-preserved lantern organ confirm that the signature firefly light apparatus was already fully developed in the mid-Cretaceous. This implies that the basic "on/off" blinking system of fireflies has been stable for tens of millions of years. It also suggests behavior: back then,

these beetles were likely nocturnal, using their flashes for survival and mating just as modern fireflies do.

Despite great promise for further study, there are still some missing pieces to the story of this remarkable fossil. As a single specimen, the holotype of *Cretoluciola birmana* represents only a small subset of the variation found in this species.

Even more, the evolutionary history of the fireflies remains partly obscure because only five of the 34 known genera were included in the study. More amber insects, particularly more members of the Lampyridae, and a more comprehensive sampling of the living fireflies will be needed to put the history of the lucioline fireflies in proper perspective.

More than just an ancient glow

Why is this important apart from throwing a new fossil into the mix? To start, this fills a major void: we can now confidently state that fireflies were already glowing in dinosaur times. These ancient lanternflies lit up forests while Tyrannosaurus and other dinosaurs roamed the earth. Secondly, it shows how the biology of fireflies has impressed technology and medicine.

So, these [luciferases](#) are also used in forensics and biotechnology. And, it shows that the amazing things we see today have a long history. The scientific and public imagination value the understanding that these "summer lights" are about 100 million years old. The classic two-part light organs of lucioline fireflies were already present in the Cretaceous, indicating a great capacity for preservation of a good idea by nature.

More information: Shuailong Yuan et al, A true Luciolinae fossil from the mid-Cretaceous Burmese amber provides new insights into the

early evolution of fireflies (Coleoptera: Lampyridae), *Proceedings of the Royal Society B: Biological Sciences* (2026). [DOI: 10.1098/rspb.2025.3316](https://doi.org/10.1098/rspb.2025.3316)

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Citation: Dinosaurs had company in the dark: Amber fossil reveals an ancient glow that lit Cretaceous nights (2026, May 12) retrieved 12 May 2026 from <https://sciencex.com/news/2026-05-dinosaurs-company-dark-amber-fossil.html>

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