

Science Why some fireflies become femme fatales in their race for survival

Fireflies are the flashy stars of the insect world. At night, you can see them coming because each little bug shines like a lamp – and, appropriately, they belong to the beetle family [Lampyridae](https://bugguide.net/node/view/85).

The “lamplight” of fireflies is generated by an enzyme inside the bugs’ abdomens called luciferase, which reacts with other elements and compounds to produce a cold light. This turns each individual firefly into a bioluminescent beauty.

Their glow is also used for courtship. Males of different firefly species use different flash patterns to [attract potential mates](http://science.sciencemag.org/content/187/4175/452). A male firefly will flash in a certain pattern for a particular length of time; he knows whether the female he’s spotted is interested based on how long it takes her to “flash” in reply.

This all sounds very romantic and beautiful. But there’s a dark secret lurking behind the facade: some female fireflies dupe the males with false flash patterns – then, when their amorous would-be partners approach, they attack and eat them. The [femme fatales](http://www.pnas.org/content/94/18/9723.short) aren’t doing this from malice or hunger: they’re trying to ingest a toxin that will keep them safe from predators.

“Come closer…”

This lethal mating ritual happens in two genera of fireflies, [Photinus](http://animaldiversity.org/accounts/Photinus_pyrallis/) and [Photuris](http://animaldiversity.org/accounts/Photuris_versicolor/).

Both of the fireflies are native to North America.

The

Photuris

female is able to mimic

Photinus’

flashing patterns; with this deception, she answers the flash patterns of a

Photinus

male. He comes closer, hoping to consummate their new relationship. Instead, she captures and eats him.

Why? Because, as the saying goes, “You are what you eat.” In this case, the

Photuris

female eats the

Photinus

male to get chemical defences that are present in his blood. The toxins can be used to fight off

<https://www.hindawi.com/journals/psyche/2012/634027/>

predators

like birds, spiders, ants and others.

When the

Photinus

male is under attack, the toxins are released as tiny droplets. By eating the male, the

Photuris

female absorbs that toxic power and makes herself safer from predation. The powerful toxins are called

<http://www.pnas.org/content/75/2/905.short>

lucibufagins

, which are steroids similar to the heart poison generated from the

<https://www.aaas.org/blog/scientia/digitalis-flower-drug-poison>

foxglove plant

Digitalis

.

When a firefly is attacked its outer skin, called the

<http://bugs.bio.usyd.edu.au/learning/resources/Entomology/internalAnatomy/cuticle.html>

cuticle

, ruptures and bitter tasting blood loaded with lucibufagins oozes out. Predators release the firefly because they can’t stand the taste.

Avoidance tactics

When a female

Photuris

eats a

Photinus

"Helvetica";" helvetica";"=""> male and absorbs his lucibufagins, she is also protecting her young. The females are able to pass on this toxic defence mechanism <http://www.pnas.org/content/94/18/9723.short> to their offspring

"Helvetica";"="">."./>."./>

The Photinus males try to protect themselves from being eaten by Photuris females. They take their time looking for the real thing: a female of their own species. One study, in a laboratory https://books.google.com.np/books?hl=en&lr=&id=eHV_8YC_NL0C&oi=fnd&pg=PA11KtF9pZ6In9pZrCY&redir_esc=y#v=onepage&q&f=false showed that Photinus males took more than seven nights to find a female of its own species, while a Photinus female of the same species took less than six minutes to attract a male for mating.

The Photinus males also change their light emitting patterns in a bid to mislead their nemesis or – if they’re quick enough – simply fly away as soon as they realise they’ve been drawn into a trap.</p></figure><p>&@font-face {font-family:Helvetica; panose-1:0 0 0 0 0 0 0 0 0; mso-font-charset:0; mso-generic-font-family:auto; mso-font-pitch:variable; mso-font-signature:-536870145 1342208091 0 0 415 0;}@font-face {font-family:"Cambria Math"; panose-1:2 4 5 3 5 4 6 3 2 4; mso-font-charset:0; mso-generic-font-family:roman; mso-font-pitch:variable; mso-font-signature:-536870145 1107305727 0 0 415 0;}@font-face {font-family:Calibri; panose-1:2 15 5 2 2 2 4 3 2 4; mso-font-charset:0; mso-generic-font-family:swiss; mso-font-pitch:variable; mso-font-signature:-536859905 -1073697537 9 0 511 0;}p.MsoNormal, li.MsoNormal, div.MsoNormal {mso-style-unhide:no; mso-style-qformat:yes; mso-style-parent:""; margin:0cm; mso-pagination:widow-orphan; font-size:12.0pt; font-family:"Calibri",sans-serif; mso-ascii-font-family:Calibri; mso-ascii-theme-font:minor-latin; mso-fareast-font-family:Calibri; mso-fareast-theme-font:minor-latin; mso-hansi-font-family:Calibri; mso-hansi-theme-font:minor-latin; mso-bidi-font-family:"Times New Roman"; mso-bidi-theme-font:minor-bidi; mso-font-kerining:1.0pt; mso-ligatures:standardcontextual; mso-fareast-language:EN-US;}h2 {mso-style-priority:9; mso-style-unhide:no; mso-style-qformat:yes; mso-style-link:"Heading 2 Char"; mso-margin-top-alt:auto; margin-right:0cm; mso-margin-bottom-alt:auto; margin-left:0cm; mso-pagination:widow-orphan; mso-outline-level:2; font-size:18.0pt; font-family:"Times New Roman",serif; mso-fareast-font-family:"Times New Roman"; font-weight:bold;}a:link, span.MsoHyperlink {mso-style-priority:99; color:blue; text-decoration:underline; text-decoration:underline:single;}a:visited, span.MsoHyperlinkFollowed {mso-style-noshow:yes; mso-style-priority:99; color:#954F72; mso-themecolor:followedhyperlink; text-decoration:underline; text-decoration:underline:single;}p {mso-style-noshow:yes; mso-style-priority:99; mso-margin-top-alt:auto; margin-right:0cm; mso-margin-bottom-alt:auto; margin-left:0cm; mso-pagination:widow-orphan; font-size:12.0pt; font-family:"Times New Roman",serif; mso-fareast-font-family:"Times New Roman";}span.Heading2Char {mso-style-name:"Heading 2 Char"; mso-style-priority:9; mso-style-unhide:no; mso-style-locked:yes; mso-style-link:"Heading 2"; mso-ansi-font-size:18.0pt; mso-bidi-font-size:18.0pt; font-family:"Times New

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