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

<span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">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 <span style="font-family: "Helvetica";" helvetica";"="">Lampyridae<span style="font-family: "Helvetica";" helvetica";"="">. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">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 <span style="font-family: "Helvetica";" helvetica";"="">bioluminescent<span style="font-family: "Helvetica";" helvetica";"=""> beauty. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">Their glow is also used for courtship. Males of different firefly species use different <span style="font-family: "Helvetica";" helvetica";"="">flash patterns<span style="font-family: "Helvetica";" helvetica";"=""> to <span style="font-family: "Helvetica";" helvetica";"="">attract potential mates<span style="font-family: "Helvetica";" helvetica";"="">. 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. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">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 <span style="font-family: "Helvetica";" helvetica";"="">femme fatales<span style="font-family: "Helvetica";" helvetica";"=""> aren’t doing this from malice or hunger: they’re trying to ingest a toxin that will keep them safe from predators. <span style="font-family: "Helvetica";" helvetica";"=""> <h2 style="margin-top:6.0pt;margin-right:0cm;margin-bottom:6.0pt;margin-left: 0cm;text-align:justify"><span style="font-size: 12pt; font-family: "Helvetica";" helvetica";"="">“Come closer…”</h2><span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">This lethal mating ritual happens in two genera of fireflies, <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> and <span style="font-family: "Helvetica";" helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"="">. Both of the fireflies are native to North America. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">The <span style="font-family: "Helvetica";"

helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"=""> female is able to mimic <span style="font-family: "Helvetica";" helvetica";"="">Photinus’<span style="font-family: "Helvetica";" helvetica";"=""> flashing patterns; with this deception, she answers the flash patterns of a <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> male. He comes closer, hoping to consummate their new relationship. Instead, she captures and eats him. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">Why? Because, as the saying goes, “You are what you eat.” In this case, the <span style="font-family: "Helvetica";" helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"=""> female eats the <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> male to get chemical defences that are present in his blood. The toxins can be used to fight off <span style="font-family: "Helvetica";" helvetica";"="">predators<span style="font-family: "Helvetica";" helvetica";"=""> like birds, spiders, ants and others. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">When the <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> male is under attack, the toxins are released as tiny droplets. By eating the male, the <span style="font-family: "Helvetica";" helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"=""> female absorbs that toxic power and makes herself safer from predation. The powerful toxins are called <span style="font-family: "Helvetica";" helvetica";"="">lucibufagins<span style="font-family: "Helvetica";" helvetica";"="">, which are steroids similar to the heart poison generated from the <span style="font-family: "Helvetica";" helvetica";"="">foxglove plant<span style="font-family: "Helvetica";" helvetica";"="">, <span style="font-family: "Helvetica";" helvetica";"="">Digitalis<span style="font-family: "Helvetica";" helvetica";"="">. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">When a firefly is attacked its outer skin, called the <span style="font-family: "Helvetica";" helvetica";"="">cuticle<span style="font-family: "Helvetica";" helvetica";"="">, ruptures and bitter tasting blood loaded with lucibufagins oozes out. Predators release the firefly because they can’t stand the taste. <span style="font-family: "Helvetica";" helvetica";"=""> <figure class="align-left "><span style="font-family: "Helvetica";" helvetica";"=""> <h2 style="margin-top:6.0pt;margin-right:0cm;margin-bottom:6.0pt;margin-left: 0cm;text-align:justify"><span style="font-size: 12pt; font-family: "Helvetica";" helvetica";"="">Avoidance tactics</h2><span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">When a female <span style="font-family: "Helvetica";" helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"=""> eats a <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family:

"Helvetica";" helvetica";"=""> male and absorbs his lucibufagins, she is also protecting her young. The females are able to pass on this toxic defence mechanism <span style="font-family: "Helvetica";" helvetica";"="">to their offspring<span style="font-family: "Helvetica";" helvetica";"="">. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">The <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> males try to protect themselves from being eaten by <span style="font-family: "Helvetica";" helvetica";"="">Photuris<span style="font-family: "Helvetica";" helvetica";"=""> females. They take their time looking for the real thing: a female of their own species. One study, in a laboratory <span style="font-family: "Helvetica";" helvetica";"="">showed<span style="font-family: "Helvetica";" helvetica";"=""> that <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> males took more than seven nights to find a female of its own species, while a <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> female of the same species took less than six minutes to attract a male for mating. <span style="font-family: "Helvetica";" helvetica";"=""> <span style="font-family: "Helvetica";" helvetica";"="">The <span style="font-family: "Helvetica";" helvetica";"="">Photinus<span style="font-family: "Helvetica";" helvetica";"=""> 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 are realise they’ve been drawn into a trap. <span style="font-family: "Helvetica";" helvetica";"=""> </figure> <style><span style="font-family: "Helvetica";">@font-face {font-family:Helvetica; panose-1:0 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-kerning: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-underline:single;}a:visited, span.MsoHyperlinkFollowed {mso-style-noshow:yes; mso-style-priority:99; color:#954F72; mso-themecolor:followedhyperlink; text-decoration:underline; text-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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