Introduction

*Melanophila acuminata* is a Canadian beetle which has a strange breeding pattern, not common to other beetle species. *M. acuminata* flies to distant forest fires in order to use dead organisms as a nutrients supply (Hart. 1998). It locates forest fires mainly by the aid of infrared radiation emitted by the flames (Evans. 1964), as well as using chemical reception of combustion by-products in the smoke of such fires. Species of *Melanophila* search for conifer forests to lay there eggs just under the bark layer of freshly burnt trees and must do so in order to reproduce (Schütz, Weissbecker, Hummel, Apel, Schmitz and Bleckmann. 1999).

BBC News published an article in March, 2005 explaining the research done by Evans on *Melanophila acuminata* and it’s infrared sensory as well as research done by Schütz and colleagues on the ability of their antennae to sense specific products of smoke. The work of Schmitz which followed Evans’ was also briefly mentioned.

Analysis of Article

The design of the article is compiling the research of two separate groups, on slightly different aspects of the beetle. The first part describes Evans’ research paper (dating back to 1964) and the second part entails Schütz’s more recent research of 1999. The interest was probably derived from the new research of Schmitz (2001-2003) on the same topic. The article begins with a description of the unusual activity of this species, “…flies in droves straight towards the inferno.” (Dalziel. 2005). This statement is in fact valid. It is true that the insects do fly towards fires which are still burning and they do so in swarms (usually). This activity has been reported numerous times and is somewhat bothersome to firefighters on duty (Hart. 1998). A second source of skepticism within the text is the
mentioning that these beetles travel a great number of kilometers to reach forest fires (Dalziel. 2005). This distance has been assumed necessary among scientists. Although, testing for both chemical reception of smoke and infrared detection had concluded that 1 km was the limit of detection. The limit has been previously published as 12 km, 20 km, 50 km, and even 80 km although no scientific evidence supports these values (Schütz, Weissbecker, Hummel, Apel, Schmitz and Bleckmann. 1999) (Sowards, Schmitz, Tomlin, Naik and Stone. 2001).

Another source of error was in the descriptions of the species. Firstly, the author misspelled the name of the species; “…acuminate” (Dalziel. 2005) as opposed to acuminata. Another problem was labeling, this is the only species with such infra-red sensors while there are 11 known species of the genus Melanophila; which display the same mechanism of infrared detection. M. acuminata is the most common of those species (Evans. 2005). It was also falsely stated that there are two Australian species of beetles which display similar infrared detection behaviors (Dalziel. 2005). But, multiple academic sources only describe one such species and it is not confirmed that it does detect infrared. This notion was merely a speculation among scientists in the field of study. The beetle Merimna atrata actually has thermoreceptors used for similar behavior, there is no evidence of infrared detection in this species (Schmitz and Trenner. 2003).

One minor detail of inaccuracy is that the author describes infrared radiation and heat as being the same thing and proceeds to say that the beetles detect the radiation in the form of heat (Dalziel, 2005). The actual physiology of the pit organ is described as maximally receiving wavelengths of electromagnetic radiation of approximately 3 micrometers. This is then converted to heat, distorting the organ to give a neurological
response.

Lastly, the article mentions these beetles as seeing the flames as well as hearing the flames (Dalziel, 2005). There is no evidence to claim that *Melanophila* can see the flames or infrared radiation emitted by the flames. Infrared is at such a wavelength that it can not be detected by insect eyes. *M. acuminata* uses comparisons of infrared intensities between the two thoracic pit organs to direct itself towards the stronger intensity (Hart, 1998). As for hearing the burning wood, there has been no such claim found and is therefore inconclusive.

**Possible Improvements of Article**

This BBC News article could be greatly improved by correcting the flaws mentioned, also, by adding significant information and detail that was neglected to be included. One important fact dismissed about the detection of forest fires is that it is species specific. Schütz suggests that distinguishing between volatile compounds released in the incomplete combustion of conifers specifically is an active process executed by these beetles. Volatile compounds detected by the antennae of *Melanophila acuminata* are mostly methoxylated phenols released by incomplete combustion of lignin (Schütz, Weissbecker, Hummel, Apel, Schmitz and Bleckmann. 1999). These substances are indicators of conifer smoke and are different between species.

Another vital piece of information is that these aren’t the only insects that act as pioneer species after these natural disasters. There are approximately 40 species of insects that travel towards fires to lay their eggs; therefore not a unique behavior of the *Melanophila acuminata*. Also, the infrared detection is not unique to the genus, as several species of snake also display characteristics that suggest similar functionality (Hart.
There is a very weak anatomical description in the BBC News article, that could easily be improved. The article could have included that there are pits consisting of 50-100 small domes (Hart. 1998). These domes are within two pits on either side of the ventral thorax, near the margin of each mesocoxal cavity. Each dome consists of a cavity filled with air, with an apical pit opening leading to lamella which is attached to the tubular body of a dendrite which travels deeper into the body (Evans. 2005).

Physiology is virtually non-existent within the text of the article. This could make the article drastically more informative. The physiology of the sensory pits happens in a chain reaction sort of way, beginning with the forest fire emitting infrared radiation; which is not constantly reaching the dome due to wing beat frequencies. The specific frequencies of infrared radiation pass through the waveguide in the apical pit where it reaches the lamella. The inner lamella heats the cavity air which deforms the tubular body. This in turn gives the dendrite action potential and the dendrite conducts an impulse (Evans. 2005). A pulse as short as 2 ms with a bend (which deforms the tubular cavity as little as 1 nm) can trigger the cell to fire (Hart. 1998).

Another piece of interesting information is that some scientists believe that (ancestrally) this may have been a primitive eye. This theory is not well supported due to the fact that morphologically the two are very different. However, it is another evolutionary path for sensing electromagnetic radiation in the environment, just not within the visible light range (Hart, 1998).

Conclusion

The BBC News article does a poor job of reporting *Melanophila acuminata* properly or
accurately. The article does get the major point across, which is the usage of sensory pit organs to receive infrared radiation, although not in a very scientific fashion.

The author has also seemingly added information in which they either assumed or added for the sake of entertainment. That sort of publication would be more thoroughly peer reviewed if it were from a more reputable source, potentially a scientific magazine.

Most of the information in the article was inaccurate and there was quite a bit of vital information absent from the text. This could be due to the author not understanding the information, assuming the public would not understand the information, assuming the public would not be interested in such detail, or a possible combinations or these reasons. There several possibilities why the author chose not to include such details.

The article was somewhat disappointing, especially from a news group such as BBC who is deemed a reputable source. There is a higher level of expectation for news groups with a better reputation than most. However, some leeway must be given since they are not typically a science oriented group.
References


Analysis and Criticism of a Popular News Article:
Jewel Beetle Flies Into the Inferno

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